SANS DIGITAL

ACCURAID ARI08I

QUICK INSTALLATION GUIDE v1.0

Foreword

Thank you for using products from **Sans Digital**. This manual will introduce to you the AccuRAID series products and help you understand the operations of the RAID system. The information stated in this manual was thoroughly confirmed before publication; however, the specifications for the shipping production will be the standard. For any product specification or related updates, please go directly to **www.sansdigital.com** or contact your local sales representative.
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AR108I Software & Hardware Quick Installation Process

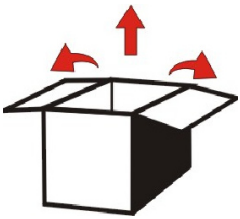
1. The Package Contents

After opening the outer box, check the content of the package, which should contain the components below:

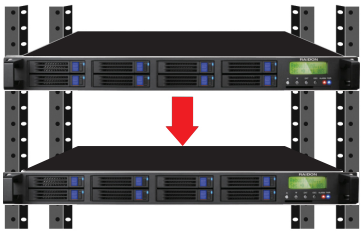
- AR108I product body
- AC Power Cord
- RS-232 port connection cable
- 2M Cat.5 Cable
- CD (User Guide)
- Quick Installation Guide
- Accessory kit

2. Refer to steps below for the hardware installation of AR108I:

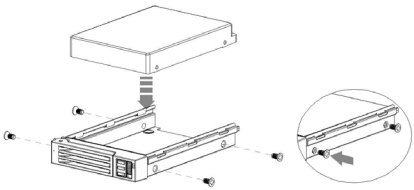
2.1. Open the external package and remove the main body of the product. (Please confirm the product and accessories are not damaged, have any missing components or other issues. For any questions, please contact your dealer or sales representative.)



2.2. Place the server on the rack and make sure the fan is not blocked and there is enough space for heat ventilation. (Please avoid installation near water sources and other environments that can easily damage the product.).

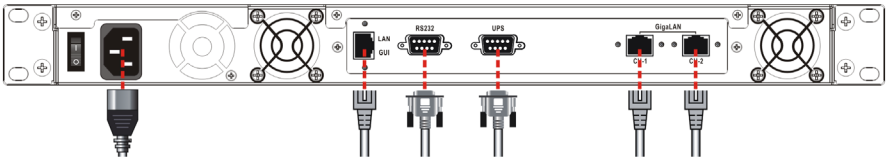


2.3. Take the tray out and install the hard disk onto the tray. Confirm the hard disk is firmly fixed to the tray with the screws to ensure no damage is caused by vibrations.



2.4. After confirming, insert the tray back and make sure it is firmly inserted in the correct location.

2.5. Connect the connection cable to the correct plugs. Make sure the LAN port or RS-232 port and expansion port (not necessary) are connected to the right cables and devices. Finally, connect the power cord (install the Terminator in the port below).



CH1 & CH2 : Transfer data.
LAN GUI : WEB interface to monitor the operation.
RS232 : Connect to the computer to monitor operation.
UPS : Enable to connect UPS system and monitor AR108I's status

2.6. Hardware installation is now complete. You may turn on the power and log into system through LAN port or RS232 port and perform related configuration and application. (The default account/password is admin/1234. IP address is 192.168.0.1)

After configuration is complete you may use the system.

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Chapter 1 Introduction to RAID

1.1 What is RAID?

RAID refers to a redundant array of independent disks or a redundant array of inexpensive disks. The storage of data makes heavy uses of hard disks no matter where it happens. The heavy use can also lead to accidents, and the ending of the life cycle of the hard disk; thus, problems such as abnormal access, slowing down or even lack of response are rather predictable. The problems may very well cause the data on the hard disk to disappear or damaged permanently. Using RAID technology is the way to ease the fear of data loss.

RAID is the technology in which data is divided and stored in many hard disks. This technology provides redundancy and establishes a fault-tolerant storage environment. Using multiple hard disks (two at the least), RAID increases storage amount and improves the data transmission speed. With RAID you will not have to worry about losing data again, because your data will be 100% completed protected.

1.2 Features of RAID

- Expand storage amount
- Speed up the access of data
- Reduce cost
- Inherent Fault Tolerance
- Hot Swap
- Auto-Rebuild
- Hot Spare
- On-line Capacity Expansion

1.3 The level and comparison of RAID

With the current technological advances the level of RAID has become broader and each company has its own naming method, but in general these are the levels: RAID 0, 1, 3, 5, 6, 0+1, 10, 30, 50, 60, and JBOD (Just a Bunch Of Disks):

RAID Level	Basic Operation concept	Available space	Data reliability	Data transmission speed	Minimum number of discs required
0	Partition the storage device	Total hard disk capacity	Low	fastest	2
1	Mirror	Half of total hard disk capacity	High	slower	2
0+1	Mirror to another set of hard disks and partition the storage device	Half of total hard disk capacity	Very High	fast	4
3	Data with same bits are stored in independent hard disks	Total hard disk capacity minus the capacity of a single disk	High	very fast	3

5	All hard disks have same bits information	Total hard disk capacity minus the capacity of a single disk	High	very fast	3
3+Spare	Data with same bits are stored in independent hard disks & backup hard disk	Total hard disk capacity minus the capacity of 2 disks	Very High	fast	4
5+Spare	All hard disks have same bits information & backup hard disk	Total hard disk capacity minus the capacity of 2 disks	Very High	fast	4
6	All hard disks have same bits information	Total hard disk capacity minus the capacity of 2 disks	Very High	fast	4

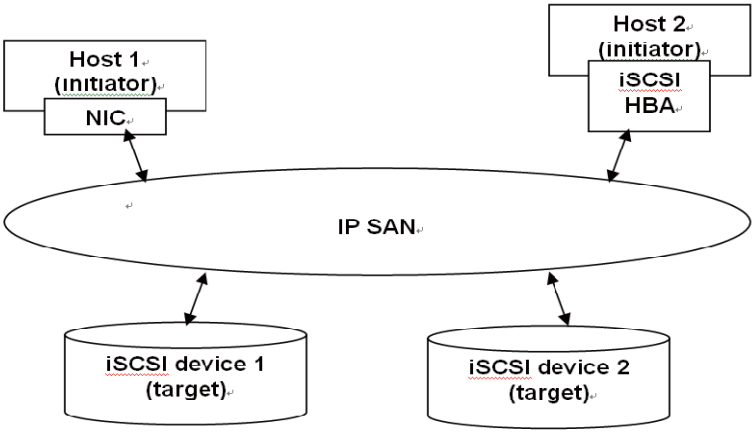
Chapter 2 Introduction of iSCSI and Definitions

2.1 What is iSCSI?

SCSI (Small Computer Standard Interface) is a parallel interface using ANSI standard to connect Peripheral Device. Because the speed of transmission is faster than other standard interface, for better Workstations and servers it is also used as the interface for HDD and other storage devices. The i-SCSI (Internet SCSI) integrates the SCSI protocol with the TCP/IP packet and connects the server and the storage device through a network. i-SCSI can help in providing highly efficient storage area network (SANs) through standard IP network such as LAN, WAN or internet. In the past, SANs was widely referred to as the storage area network constructed with fiber optic. With the influence of iSCSI, current SANs are divided into FCSANs and IP-SANs. IP-SAN sends protocols through iSCSI, which allows the server to increase the amount of storage limitlessly through the internet. That's why it is truly a storage network system by nature. IP-SANs can use different types and brands of storage system to increase storage space. Also, under the SANs structure, any network type (Ethernet, High Ethernet or Fast Ethernet) and different operation system (Microsoft Windows, Linux, Solaris, and so on) may be used. IP-SANs include security, data replication, multi-channel and high efficiency mechanisms as well.

2.2 Using iSCSI

In order to use the iSCSI storage protocol, there must be "two terminals" for connection and they are called "initiator" and "target". In the iSCSI world they are the "iSCSI initiator" and "iSCSI target". The iSCSI initiator requests the operation, such as read and write, of all SCSI's and it is usually located at the Host or server. iSCSI target manages and determines the volume for the storage device. Basically it is the device that runs SCSI commands. The iSCSI target can be a disk, a tape or RAID.



The Host needs an iSCSI initiator, which is the driver that controls the SCSI in the iSCSI. It may be a piece of software or hardware (HBA). Please refer to the iSCSI HBA list in Appendix A to confirm if your HBA card is compatible. The Initiator software uses standard TCP/IP protocol and Ethernet device and the iSCSI HBA card uses the iSCSI and TCP/IP protocol from the manufacturer; the iSCSI HBA card manufacturer will provide their own initiator tool. Please refer to your HBA manual for more detailed explanations. Microsoft's iSCSI initiator software can be downloaded from the address below:

http://www.microsoft.com/downloads/details.aspx?FamilyID=12cb3c1a-15d6-4585-b385-befd1319f825&DisplayLang=en
For installation procedure for Microsoft iSCSI initiator, please refer to Appendix D.
Linux also provides iSCSI initiator software for downloads, please refer to the address below:
Description page: http://linux-iscsi.sourceforge.net/
Download link: http://sourceforge.net/project/showfiles.php? group_id=26396
Document: http://www.cuddletech.com/articles/iscsi/iscsiref.pdf
For MAC operating system, please refer to the address below:
http://www.attotech.com/xtend.html
For other application software, please refer to the instructions on the original web site.

2.3 Definitions

These terms below are used in this manual:

RAID	Redundant Array of Independent Disks	DS	Dedicated Spare disks
PD	Physical Disk	GS	Global Spare disks
VG	Volume Group	DC	Dedicated Cache
UDV	User Data Volume	GC	Global Cache
CV	Cache Volume	DG	DeGrade mode
LUN	Logical Unit Number	S.M.A.R.T.	Self-Monitoring Analysis and Reporting Technology.
GUI	Graphic User Interface.	WWN	World Wide Name.
WT	Write-Through	HBA	Host Bus Adapter.
WB	Write-Back	MPIO	Multi-Path Input/Output.
RO	Read-Only	MC/S	Multiple Connections per Session
S.E.S	SCSI Enclosure Services	NIC	Network Interface Card
iSCSI	Internet Small Computer Systems Interface	LACP	Link Aggregation Control Protocol
MTU	Maximum Transmission Unit	CHAP	Challenge Handshake Authentication Protocol
iSNS	Internet Storage Name Service		

Chapter 3 Things to Know Before Using AccuRAID AR108I

3.1 What you should know before installing

3.1.1 Features of AccuRAID AR108I series products

AccuRAID AR108I series is a high performance RAID system which features:
- Dual Gigabit channel design
- Supports RAID level 5, 6
- Hot-swappable
- N-way mirror
- GUI operation interface
- On-line Capacity Expansion and RAID level change
- Volume-adjusted shared/ dedicated cache structure
- Supports S.M.A.R.T
- Supports SES
- Supports Disc roaming
- Equipped with MPIO (requires initiator software support)
- Equipped MC/S (requires initiator software support)
- Support CHAP

AccuRAID AR108I series product is connected to the main system through iSCSI interface and can be applied to any RAID level. AccuRAID AR108I series product provides you with dependable data protection and can support RAID level 6. RAID level 6 allows 2 hard disk crashes without any effect on stored information. The data on the damaged hard disk can be recovered from hard disks operating normally.

AccuRAID AR108I series provide high standard performance and data protection abilities, which make them the most cost-effective optimal solution for network data storage.

3.1.2 Confirming related devices

Before installing related products, please confirm items below:
- Open the external package and take out the main body of the product and confirm the product and accessories aren't damaged, missing components and other issues.
- Compare with the certification list in Appendix A to ensure the hardware is supported.
- Equipped with a server with a network interface card or an iSCSI HBA card
- Have CAT 5e or CAT 6 network cable for managing and for the iSCSI port. CAT 6 is recommended for optimal performance.
- Plan Storage System Structure in advance
- If a fixed IP is used for management port and the iSCSI data port, you must have fixed IP Address, subnet mast and default gate information.
- High-speed switch (recommended) or VLAN/LCAP/Trunking function high speed switch (non-essential)
- CHAP security data including the user names and passwords for the CHAP users (non-essential)
- Before booting, install all required hardware. Connect control port first, and then the cable to management port and iSCSI port.

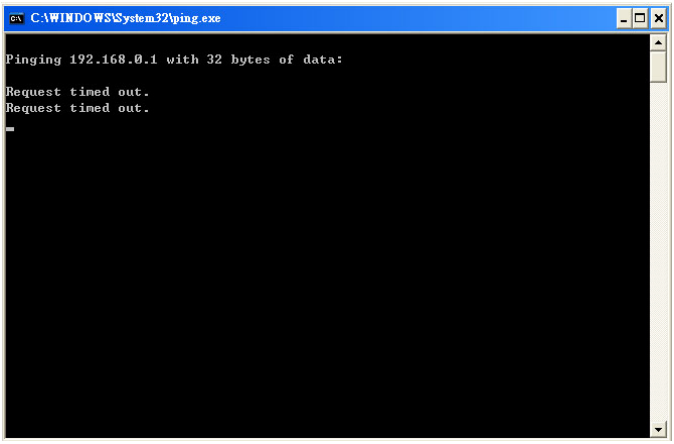
3.2 Management method

There are 3 ways to manage the AccuRAID AR108I series product. See explanations below:

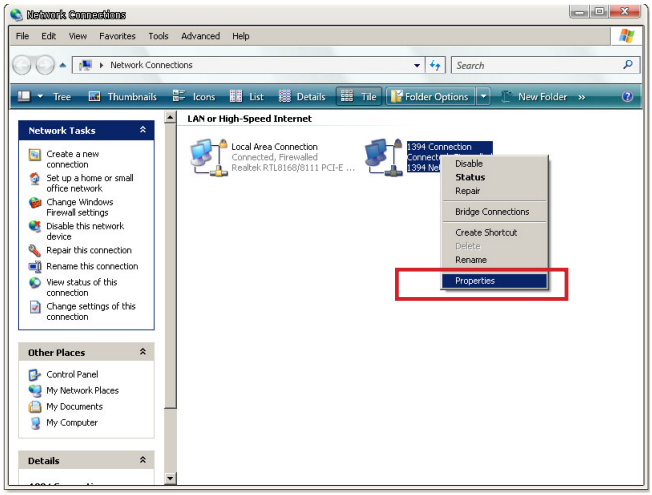
3.2.1 User management interface (Web GUI)

The AccuRAID AR108I series support GUI for system management. Please confirm related network ports are connected. For connection through the network port, if using a fixed IP, make sure the fixed IP Address doesn't conflict with other IP Addresses. Use a "ping" to check if the IP Address conflicts with other IPs.
The default IP address for AccuRAID AR108I series: 192.168.0.1. Use 2 network cables to connect Web GUI and Giga LAN separately.

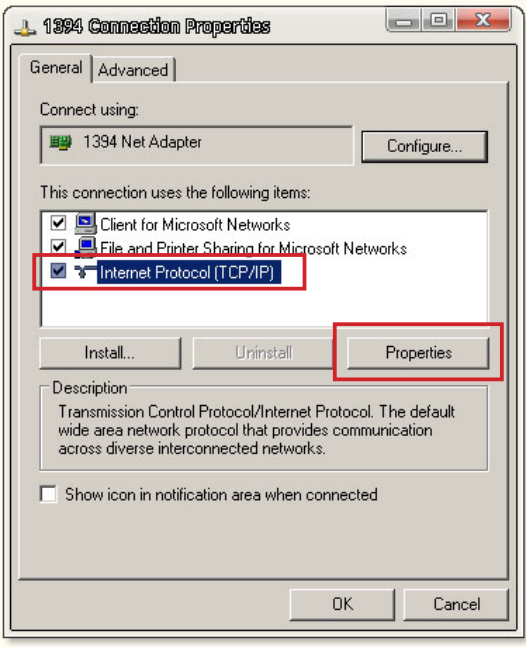
1) Check in advance if the IP addresses conflict. Click Start→Run→Enter ping xxx.xxx.xxx.xxx (or the address you'll be using). If the system displays "Request time out," then the address is available. Asking your MIS for the IP address is recommended.



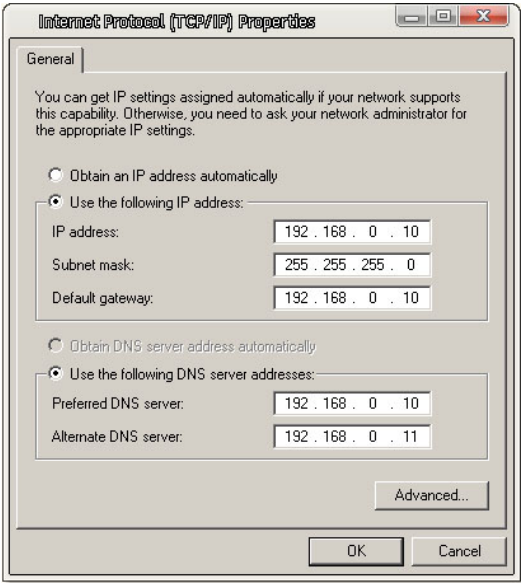
2) Network configurations. The Network IP have to be consistent with AccuRAID AR108I (192.168.0.X). Then you can find the device with the default IP. Click Start→Configuration→Network Connections and the network connection window will appear. Right click the connection and select "Properties".



3) Select “Internet Protocol (TCP/IP)” and then select “Properties” and the tab for IP Address configuration will appear.



4) Configure IP Address, subnet mask, gate and DNS. For IP Address, get it from your MIS staff.


Internet Protocol (TCP/IP) Properties
General
You can get IP settings assigned automatically if your network supports this capability. Otherwise, you need to ask your network administrator for the appropriate IP settings.
Obtain an IP address automatically
Use the following IP address:
IP address: 192 . 168 . 0 . 10
Subnet mask: 255 . 255 . 255 . 0
Default gateway: 192 . 168 . 0 . 10
Obtain DNS server address automatically
Use the following DNS server addresses:
Preferred DNS server: 192 . 168 . 0 . 10
Alternate DNS server: 192 . 168 . 0 . 11
Advanced...
OK
Cancel

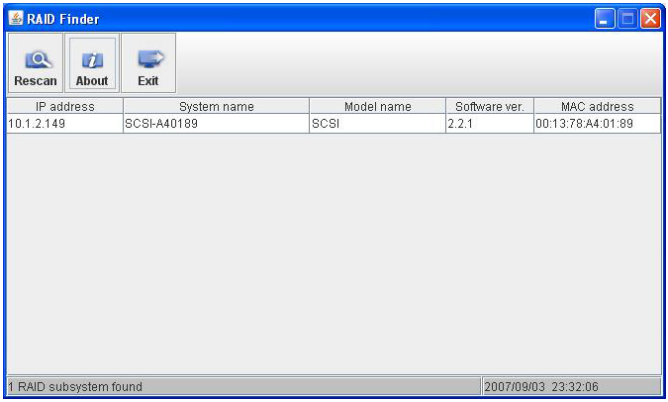
5) After entering the information click “OK” to complete setting (if changing IP Address later, please confirm the IP address for AccuRAID AR108I series product is under the same network to ensure the proper operation of the system).

6) System login. The default IP Address for AccuRAID AR108I series products is 192.168.0.1. Open browser and enter http://192.168.0.1
Click and select any function for first use and a window will appear asking for password. The default account and password are below:

Login name: admin
Default password: 1234
Press “OK” to complete login.

3.2.1.1 RAID Finder

RAID Finder software can easily find the IP Address of AccuRAID AR108I installed in the network and help the process of getting on to the login screen. You can insert the disc and select “RAID Finder” in the “Management Software” to install. Or go to “RAID Finder” folder under “Management Software” and click “RAIDFinder.jar” to perform installation. Complete the installation and run the software, which will automatically search for AccuRAID AR108I in the network and display related information. Click and select the device IP address to be managed and the software will automatically open the browser and display the login. Enter the account and password to login system to configure settings.



Notice : 1. RAID Finder is a Java application, so install Java before using (download at www.java.com).
2. RAID Finder can only find products from AccuRAID with firmware ver. 2.2.1 and above.
3. If the AccuRAID AR108I installed is configured on different networks such as 192.168.0.xxx and 192.168.1.xxx, RAID Finder can still find them at the same time but multiple network interface cards are needed, such as two cards configured with addresses 192.168.0.xxx and 192.168.1.xxx separately.

3.2.2 RS-232 connect port

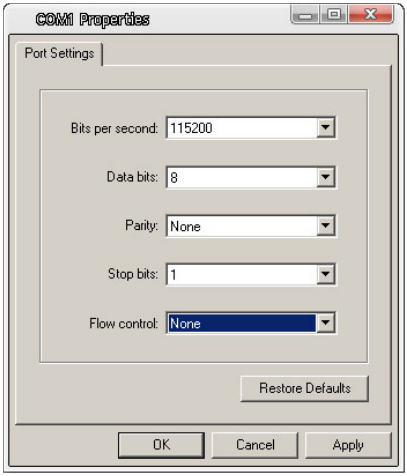
You can manage and configure the system through RS-232 directly or if you forget the initially configured IP Address, you can use RS-232 port to enter the system for configuration.

1) Connect using the RS-232 cable in the accessory pack. Boot after finish connecting.

2) Click and select Start → Programs → Applications → Communications → Mega Terminal for terminal data configuration. First, name this terminal.

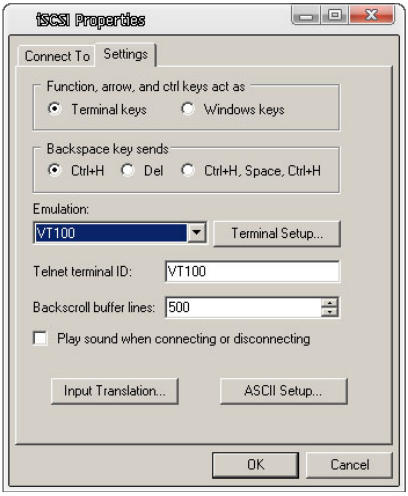
3) Next, select port location.

4) Then configure settings.

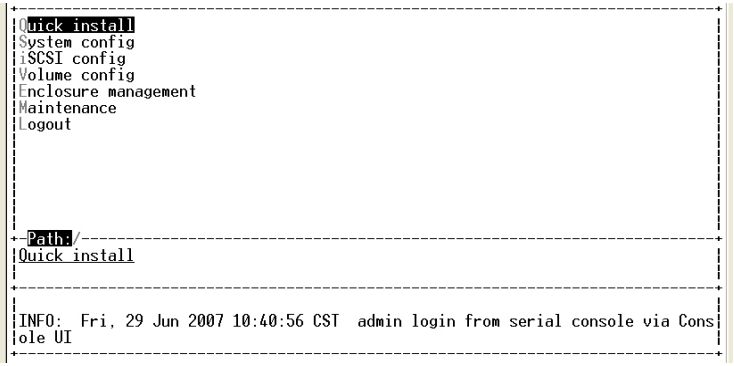


Bits per second: 115200
Data bits: 8 bytes
Parity: None
Stop bits: 1
Flow control: None

5) Select terminal emulation. Click and select File → Properties → Settings. Configure the terminal emulation as VT100.
After configuration is done, click and select “OK” to complete connection.



6) After connecting, enter the account and password to complete login. The operation is similar to web GUI user interface mode

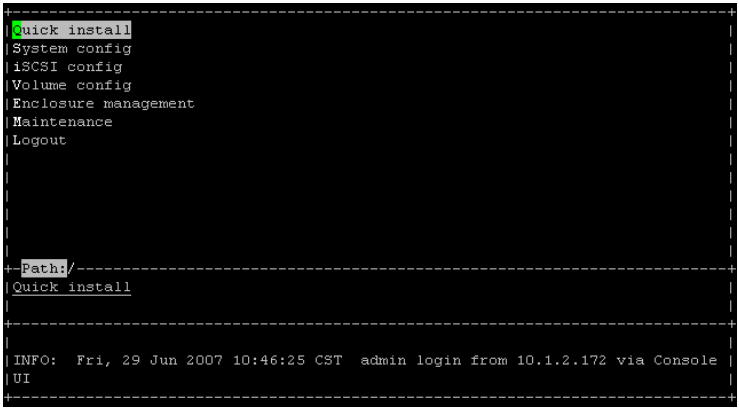


Login name: admin; Default Password: 1234

3.2.3 Remote access – secure shell

SSH (secure shell) permits remote login for AccuRAID AR108I series products.
Download SSH client software at the site below:
SSHWinClient WWW: http://www.ssh.com/
Putty WWW: http://www.chiark.greenend.org.uk/

Host name: 192.168.0.1
Login name: admin
Default password: 1234



Hint : AccuRAID AR108I series support SSH for remote control. When using SSH function, the system will require IP address and password at login.

3.3 System access

3.3.1 LCM

Use up, down, ESC and ENT to control LCM (LCD Control Module). The system will display the screen below after booting is completed:

Press ENT and you can select LCM functions using up or down buttons. When warnings or errors occur, LCM will display related message on the screen to provide more information to the user.

The Description for LCM functions is below:

Alarm Mute	To turn off the alarm sound when an error occurs
Reset/Shutdown	To reset or shutdown the controller
Quick Install	To use “Quick Install” to set up a volume by three steps. Please refer to section 4.3 for configure via the web-based GUI
View IP Setting	To view current IP address, subnet mask and gateway
Change IP Config	To set up the IP address, subnet mask and gateway. You can choose to use DHCP server (for IP address allocation) or manually specify the IP address
Reset to Default	To restore factory defaults: Default Password: 1234 Default IP address: 192.168.0.1 Default subnet mask: 255.255.255.0 Default gateway: 192.168.0.254

LCM architecture reference diagram

<table>
<tr><td>[Alarm Mute]</td><td>[▲Yes No▼]</td><td></td><td></td></tr>
<tr><td rowspan="2">[Reset/Shutdown]</td><td>[Reset]</td><td>[▲Yes No▼]</td><td></td></tr>
<tr><td>[Shutdown]</td><td>[▲Yes No▼]</td><td></td></tr>
<tr><td rowspan="2">[Quick Install]</td><td rowspan="2">RAID 0
(RAID 1/RAID 3/
RAID 5/RAID 6)
xxxxxx MB</td><td>Volume Size
(xxxxxx M)</td><td>Adjust Volume
Size</td></tr>
<tr><td>Apply The Config</td><td>[▲Yes No▼]</td></tr>
<tr><td rowspan="4">[View IP Setting]</td><td>[IP Config]
[Static IP]</td><td></td><td></td></tr>
<tr><td>[IP Address]
[192.168.000.001]</td><td></td><td></td></tr>
<tr><td>[IP Subnet Mask]
[255.255.255.0]</td><td></td><td></td></tr>
<tr><td>[IP Gateway]
[192.168.000.254]</td><td></td><td></td></tr>
<tr><td rowspan="5">[Change IP Config]</td><td>[DHCP]</td><td>[▲Yes No▼]</td><td></td></tr>
<tr><td rowspan="4">[Static IP]</td><td>[IP Address]</td><td>Adjust IP address</td></tr>
<tr><td>[IP Subnet Mask]</td><td>Adjust Submask IP</td></tr>
<tr><td>[IP Gateway]</td><td>Adjust Gateway IP</td></tr>
<tr><td>[Apply IP Setting]</td><td>[▲Yes No▼]</td></tr>
<tr><td>[Reset to Default]</td><td>[▲Yes No▼]</td><td></td><td></td></tr>
</table>

Notice : Perform “Shutdown” first before turning off power to ensure no data is left in the cache

3.3.2 System alarm

Explaining System Alarm:

1) The system is successfully turned on and the alarm will sound the confirm

2) When the system crashes or when an error happens, the system Alarm will continue to sound. You can select to turn the alarm off with the “Alarm Mute” option.

Chapter 4 Introduction to User Interface (AccuRAID AR108I)

4.1 User interface structure

User interface structure is shown below:

Quick Install	→	Step 1 / Step 2 / Step 3 / Confirm
System Config		
System name	→	System name
IP address	→	DHCP / Static / HTTP port / HTTPS port / SSH port
iSCSI	→	iSNS / Authentication / Link aggregation or Multi-homed / IP settings / Default gateway / Set MTU
Language	→	Auto Detect / English / Simple Chinese
Log config	→	Auto Logout / Login Lock
Password	→	Old password / Password / Confirm
Date	→	Date / Time / Time zone / Daylight saving / NTP / Server
Mail	→	Mail-from address / Mail-to address / SMTP relay / Authentication / Send test mail
SNMP	→	SNMP trap address / Community
Messenger	→	Messenger IP / Computer name
System log server	→	Server IP / Hostname / Port / Facility / Event Level
Event log	→	Filter / Mute / Clear / Download
iSCSI Config		
Entity Property	→	Entity name / iSNS IP
NIC	→	Name / DHCP / IP Address Netmask / Gateway / MTU / MAC Address / Link / Entity Name
Node	→	Name / Auth
Session	→	Initiator Name / TPGT / Error Recovery Level / Error Recovery Count
CHAP account	→	User
Physical disk	→	Free disc / Global spares / Dedicated spares / More information
Volume group	→	Create / Delete / More information / Rename / Migrate
User data volume	→	Create / Delete / Attach LUN / More information / Rename / Extend / Set read/write mode / Set priority
Cache volume	→	Create / Delete / More information / Resize
Logical unit	→	Attach / Detach
Enclosure management		
SES Config	→	Enable / Disable
Hardware Monitor	→	Item / Information / Confirm
S.M.A.R.T.	→	S.M.A.R.T. for physical disks
UPS	→	UPS Type / Shutdown Battery Level / Shutdown Delay / Shutdown UPS
Maintenance		
Upgrade	→	Browse the firmware to upgrade
Info	→	System information
Reset to default	→	Reset to factory default
Config Import & Export	→	Import / Export / Import File
Shutdown	→	Reboot / Shutdown
Logout		

4.2 Login

AccuRAID AR108I series support Graphic User Interface (GUI) for system management. Please confirm the network cable has been connected and is set for the same network as your current devices. Below uses the default IP Address: 192.168.0.1 as example. Open browser and enter: http://192.168.0.1

For first use, click and select any function, and a dialog window will appear and ask for the account and password. The default account and password is below:

Login account: admin
Default password: 1234

After login, click and select the function menu on the left in the window to perform related configurations.

The upper right corner will display 4 icons, which represent:

1. RAID: Green means the RAID is operating normally. Red means there is an error with RAID.

2. Temperature: Green means normal. Red means the system temperature is abnormal.

3. Voltage: Green means normal. Red means abnormal voltage status. Refer to chapter 4.6.2. for more information.

4. UPS: Green means normal. Red means abnormal UPS.

4.3 Speedy installation

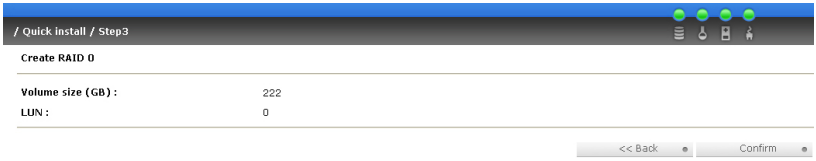
You can use the “Quick install” function to perform quick configurations. With RAID levels 0, 1, 3, 5, 6, the system will automatically calculate the maximum available space and it depends on the number of your hard disks or the space left.

1) After selecting “Quick install”, the system will ask you to configure your RAID level. After configuring the RAID level, click and select “ Next >> ” to go to the next page and perform “LUN” configuration process.

2) Please select an amount for the Logic Unit (LUN). You can change the capacity of the amount. The page will display the maximum storage space. Please enter a value smaller or equal to the maximum storage capacity. After confirming, please click and select “ Next >> ”

3) Confirmation page. The system will display all related information. If the information is correct, click and select“ Confirm ”

   After completing the process you can use this system.



4) For the details of the process see introduction below

4.4 System structure

The “System config” option allows you to change settings for basic system management functions.

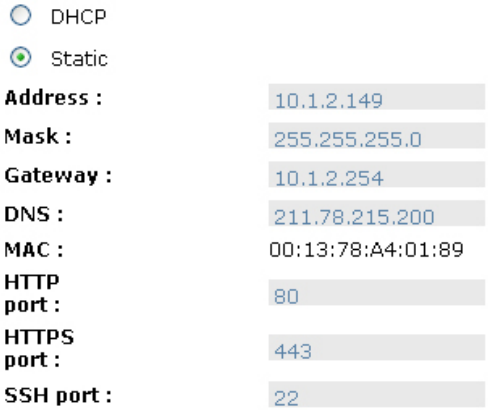
System name	System name for identification
IP address	Internet Protocol(IP) address for remote administration
Language	Language preference for WebUI
Login config	Configuration for auto logout and login lock
Password	Administrator's password
Date	System time for event log
Mail	Alert by e-mail
SNMP	Alert via Simple Network Management Protocol(SNMP)
Messenger	Transmits net send and Alerter service messages between clients and servers
System log server	Alert to remote system log server
Event log	System event log to record critical events

4.4.1 System name

Select “System name” to change System Name. The default System Name is the product name and serial number of the system. An example name is ISCSI-A40189.

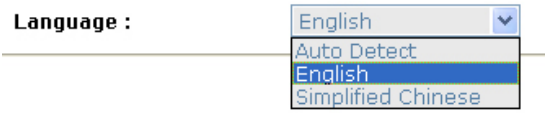
4.4.2 IP address

Select “IP address” to change the IP Address on the remote control page. You can select DHCP (get IP from DHCP) or fixed IP. If needed, select the transmission port for HTTP, HTTPS and SSH.



4.4.3 Language

Click and select “Language” to configure the display language for the GUI.



4.4.4 Login configuration

Select “Login config” to set the time for a single login and auto logout. Single login is used to avoid multiple users accessing the same data at the same time.

1) Auto logout: the options (1) Disable (2) 5 min (3) 30 min (4) 1 hour. When the user does not perform any actions within the time limit, the system will automatically logout the user to allow other users to login.

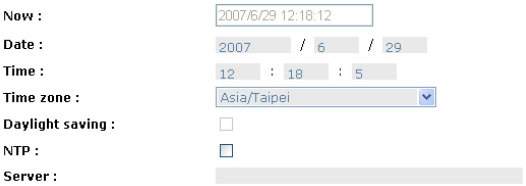
2) Login block: Disable/Enable. When the Login block is on, the system will permit one user to login/ change system configuration.

4.4.5 Password

Click and select “Password” to change administrator password. Enter the old password first and then the new password twice.

4.4.6 Date

Click and select “Date” to configure the current date and time or select “NTP” to perform online time adjustment (it’s recommended to configure first before using to ensure the time of the entire system is consistent).

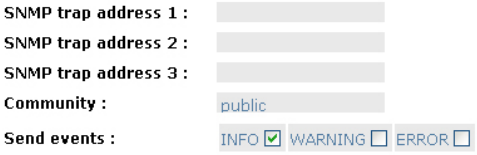


4.4.7 E-mail

Click and select “Mail” and you can enter 3 sets of E-mail boxes to receive event notices. You can also place a check in the event notice boxes next to the mail address to send to the mailbox.
Some E-mail servers check the “Mail-from address” and perform anti-spam measures. Please fill in the required fields the related information and then click and select “Send test mail” to ensure the system functions properly.

4.4.8 Easy Network Management Protocol (SNMP)

Click and select “SNMP” to configure SNMP (Simple Network Management Protocol) trap message. There can be at most 3 sets of SNMP configuration message addresses. The default community is “public”.

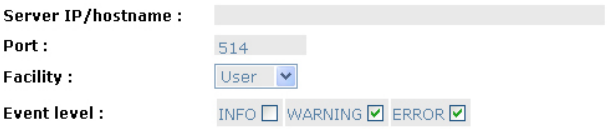


4.4.9 Messenger (Windows only)

If the “Messenger” function is opened, when an event happens, the user will see a notification window. To use this function normally in Windows, activate the “Messenger” function. You can find this function by going to Control Panel→ System Management→ Service→ Messenger and configure. At most, 3 Messenger addresses may be configured. The default notification events are “Warning” and “Error”.

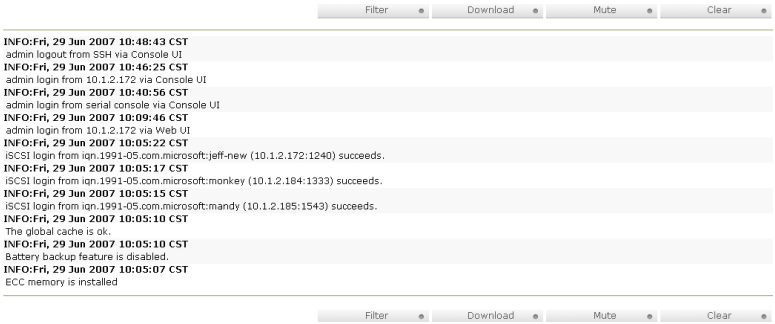
4.4.10 System log server

System log server supports remote login RAID sub-system’s event log. Remote login means the event log can be sent from a RAID sub-system to any machine running “syslogd”, and can be recorded as file data.
To activate this function, AccuRAID AR108I must be treated as the “Target”. Fill related information according to the screen shot below. The default communication port is 514.
Currently, Windows and MAC do not perform server log services and you must search for providers.



4.4.11 Event log

Click and select “Event log” to see event messages. Click and select “Filter” to display the content of the log. Click and select “Download” to save all the event logs as text files, such as “log-xxxx.txt”. Click and select “Clear” to delete all event logs. Click and select “Mute” to turn off system alarm.


Filter
Download
Mute
Clear
INFO:Fri, 29 Jun 2007 10:48:43 CST
admin logout from SSH via Console UI
INFO:Fri, 29 Jun 2007 10:46:25 CST
admin login from 10.1.2.172 via Console UI
INFO:Fri, 29 Jun 2007 10:40:56 CST
admin login from serial console via Console UI
INFO:Fri, 29 Jun 2007 10:09:46 CST
admin login from 10.1.2.172 via Web UI
INFO:Fri, 29 Jun 2007 10:05:22 CST
iSCSI login from iqn.1991-05.com.microsoft:jeff-new (10.1.2.172:1240) succeeds.
INFO:Fri, 29 Jun 2007 10:05:17 CST
iSCSI login from iqn.1991-05.com.microsoft:monkey (10.1.2.184:1333) succeeds.
INFO:Fri, 29 Jun 2007 10:05:15 CST
iSCSI login from iqn.1991-05.com.microsoft:mandy (10.1.2.185:1543) succeeds.
INFO:Fri, 29 Jun 2007 10:05:10 CST
The global cache is ok.
INFO:Fri, 29 Jun 2007 10:05:10 CST
Battery backup feature is disabled.
INFO:Fri, 29 Jun 2007 10:05:07 CST
ECC memory is installed
Filter
Download
Mute
Clear

There are 3 ways to display an event log: to display in the event log; the system pops up a dialog window; display on LCM. Configure whichever your wish.

Show events :	INFO ☐	WARNING ☑	ERROR ☑
Pop up events :	INFO ☐	WARNING ☐	ERROR ☐
Show on LCM :	INFO ☐	WARNING ☑	ERROR ☑

4.5 iSCSI configuration

Click and select “iSCSI config” to allow you change the settings for iSCSI functions.

Entity property	iSCSI entity property
NIC	iSCSI portal configuration
Node	iSCSI node configuration
Session	iSCSI session information
CHAP account	Add/Remove account for iSCSI node

4.5.1 Entity property

This can be used to display the entity name and entering IP Address for iSNS. Use iSNS function, the storage device can handover the management process to iSNS server and the manager and manage the entire storage network through iSNS server.

Entity name :	iqn.2001-08.tw.com
iSNS IP :	

4.5.2 NIC

You can configure the related IP address for two transmission channels. Click and select “ DHCP no ” to use DHCP or fixed IP Address. Click and select “ Gateway 10.1.2.254 ” to configure the IP address for the gate and click and select “ MTU 1500 ” to configure MTU value.

Name	DHCP	IP address	Netmask	Gateway	MTU	MAC address	Link
LAN1	no	10.1.2.60	255.255.255.0	10.1.2.254	1500	00:13:78:04:00:96	up
LAN2	no	10.1.2.70	255.255.255.0	10.1.2.254	1500	00:13:78:04:00:97	down

Entity name : iqn.2001-08.tw.com.RADION:iscsi-000a40189

4.5.3 Node

This displays Node name. Click and select “ Auth CHAP ” to configure whether CHAP function is used.

Name	Auth
iqn.2001-08.tw.com.	None

4.5.4 Session

This displays the amount of currently connected. Click and select “ No 0 1 ” to display detail information for the connection including “Initiator IP”, “Initiator name” and “Authentication”.

	No	Initiator name	TPGT	Error recovery level	Error recovery count
☐	0	iqn.1991-05.com.microsoft:mandy	0x00	0	0
☐	1	iqn.1991-05.com.microsoft:monkey	0x00	0	0

No.	Initiator IP	Initiator name	Authentication
1	10.1.2.185	iqn.1991-05.com.microsoft:mandy	CHAP

4.5.5 CHAP account

This can configure CHAP related data. Click and select “ Create ” to add new CHAP users. Click and select “ Delete ” to delete the current user. Click and select “ User raidon ” to configure user related information.

	User
☐	raidon

4.6 Volume configuration

“Volume config” option allows you to configure volume functions.

Physical disk	Hard disks to store data
Volume group	Sets of physical disks with RAID functions
User data volume	Slices of volume groups
Cache volume	Dedicated or global cache space for user data volume
Logical unit	Target volumes for hosts access

4.6.1 Physical hard disk

Go to “Physical disk” to verify the status of the hard disk installed in the system.
Below explains the operation process:

1) Multiple select. Check one or more boxes to select one or more disks, or check the select all box on the upper left and the system will automatically select all hard disks. Click and select confirm again to cancel all selections.

2) If there are no VG or there’s only RAID 0, or VG under JBOD mode the list will not appear because the configuration for dedicated disks is not possible under these RAID levels.

3) “ Free disks ”, “ Global spares ” and “ Dedicated spares ” These 3 functions offer options for multiple selections.

4) The control for other functions such VG volume establishment, UDV, CV and LUM is stated above.

	Slot	WWN	Size (GB)	VG name	Status	1	2	Speed
☐	1	2007001378a40b9b	148		Good	FR		1.5Gb/s
☐	2	2008001378a40b9b	148		Good	FR		1.5Gb/s
☐	3	204c001378a40178	297		Good	FR		3.0Gb/s
☐	4	2005001378a40991	465		Good	FR		3.0Gb/s

Auto spindown : Disabled

	Slot	WWN	Size (GB)	VG name	Status	1	2	Speed
☐	1	205f001378a40537	698		Good	FR		3.0Gb/s
☐	2	2004001378a406e4	74		Good	FR		3.0Gb/s
☐	3	2008001378a40b9b	148		Good	FR		1.5Gb/s
☐	4	2001001378a40ba9	232		Good	FR		3.0Gb/s
☐	5	2002001378a4086b	148		Good	FR		3.0Gb/s
☐	6	2003001378a406e4	74		Good	FR		3.0Gb/s
☐	7	2005001378a406e4	148		Good	FR		1.5Gb/s
☐	8	2008001378a40b68	148		Good	FR		1.5Gb/s

	Slot	WWN	Size (GB)	VG name	Status	1	2	Vendor	Firmware version	Write cache	Standby	Readahead	Command queuing	Speed
☐	1	2008001378a4106d	931		Good	FR		Hitachi	ST6OA31B	Enabled	Disabled	Enabled	Enabled	3.0Gb/s
☐	2	2009001378a4106d	931		Good	FR		Hitachi	ST6OA31B	Enabled	Disabled	Enabled	Enabled	3.0Gb/s
☐	3	2007001378a4106d	931		Good	FR		Hitachi	ST6OA31B	Enabled	Disabled	Enabled	Enabled	3.0Gb/s
☐	4	200a001378a4106d	698		Good	FR		Hitachi	GK8OAB0A	Enabled	Disabled	Enabled	Enabled	1.5Gb/s
☐	5	2013001378aa01e1	698	5	Good	RD		Hitachi	GK8OAB0A	Enabled	Disabled	Enabled	Enabled	3.0Gb/s

• Physical hard disk field explained:

Slot	The slot number of the hard disk. The blue button next to the number indicates “More Information” function. Clicking it shows the details of the hard disk.
WWN	World Wide Name.
Size (MB)	Disk volume
VG Name	Associated Volume Group name.
Status	Disk state: “GOOD” → The hard disk is good. “DEFECT” → The hard disk has errors. “FAIL” → The disk fails to function properly.
Status 1	“RD” → RAID Disk. This hard disk has been configured with a RAID level. “FR” → FRee disk. This hard disk is free for use. “DS” → Dedicated Spare. This disk has been configured to be the dedicated spare of the VG. “GS” → Global Spare. This disk has been configured to be a global spare of all VGs. “RS” → ReServe. The disk contains the VG information but cannot be used. It may be caused by incomplete VG configure, or hot-plug of this hard disk during system operation. In order to protect the data in the hard disk, the status is changed to reserve automatically. It can be reused after configuring it to “FR” manually.
Status 2	“R” → Rebuild. The hard disk is under rebuilding “M”→ Migration. The disk is under data migration
Speed	3.0G → The hard disk speed can reach the SATA2 level (3.0Gbps) 1.5G → The hard disk speed can reach the SATA1 level (1.5Gbps) Unknown → The hard disk does not support either of above levels

• Operation for Physical hard disk explained:

FREE DISC	Configure the selected hard disk(s) to be free for use
GLOBAL SPARES	Configure the selected hard disk(s) to be the global spare of all VGs
DEDICATED SPARES	Configure the selected hard disk(s) to be dedicated spare of selected VGs

4.6.2 Volume Group (VG)

Click and select “Volume group” to view the status for each Volume Group

• VG field explained:

No.	Name	Total (GB)	Free (GB)	#PD	#UDV	Status	1	2	3	RAID
1	QUICK18724	297	297	4	0	Online				RAID 0

No.	Volume group number. The blue button next to the number indicates “More Information” function. Clicking it shows the details of the volume group.
Name	Volume group name. The blue button next to the name indicates “Rename” function.
Total(MB)	Total capacity of this volume group
Free(MB)	Free capacity of this volume group
#PD	The number of physical disks of the volume group

#UDV	The number of user data volumes of the volume group
Status	The status of volume group “Online” → Volume group is online “Fail” → Volume group fails
Status 1	“DG” → DeGraded mode. This volume group is not completed. The reason could be lack of one hard disk or hard disk failure.
Status 2	“R” → Rebuild. This volume group is under rebuilding.
Status 3	“M” → Migration. This volume group is under migration.
RAID	The RAID level of the volume group. The blue button next to the RAID level indicates “Migrate” function. Clicking “Migrate” allows adding disk(s) for expansion or changing the RAID level of the volume group.

• VG operation explained:

CREATE	Create a volume group
DELETE	Delete a volume group

4.6.3 User Data Volume (UDV)

Go to “User data volume” function to view the status for each User Data Volume

• UDV field explained:

No.	Number of this user data volume. The blue button below the UDV number indicates “More Information” function. It shows the details of the user data volume.
Name	Name of this user data volume. The blue button below the UDV Name indicates “Rename” function.
Size(MB)	Total capacity of this user data volume. The blue button below the size indicates “Extend” function.
Status	The status of this user data volume: “Online” → User data volume is online. “Fail” → User data volume fails.
Status 1	“WT” → Write Through. “WB” → Write Back. The blue button below the status 1 indicates “Set read/write mode” function
Status 2	“HI” → HIgh priority. “MD” → MiD priority. “LO” → LOw priority. The blue button below the status 2 indicates “Set Priority” function
Status 3	“I” → User data volume is initializing “R” → User data volume is under rebuilding “M” → User data volume is under migration
R %	Ratio of initializing or rebuilding
RAID	The RAID level that user data volume is using
#LUN	Number of LUN(s) that data volume is attaching
VG name	The VG name of the user data volume
CV (MB)	The cache volume of the user data volume

• UDV control explained:

ATTACH LUN	Attach to a LUN
CREATE	Create a user data volume
DELETE	Delete a user data volume

4.6.4 Cache Volume (CV)

Go to “Cache volume” to view the status of Cache Volume.
Shared Cache Volume is the default Cache Volume and it will be automatically established after the power is on and cannot be deleted. The capacity of shared Cache Volume is dependent on the capacity of RAM. The amount equals the volume for total memory subtracts the memory taken by the system and its use is to increase the speed for data flow and improve system performance.

• CV field explained:

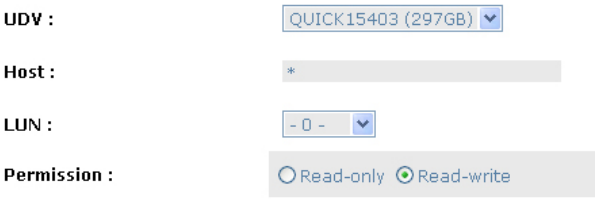
No.	Number of the cache volume. The blue button next to the CV number indicates “More Information” function. It shows the details of the cache volume.
Size(MB)	Total capacity of the cache volume. The blue button next to the CV size indicates “Resize” function. The cache volume size can be adjusted through the above function.
UDV Name	Name of UDV

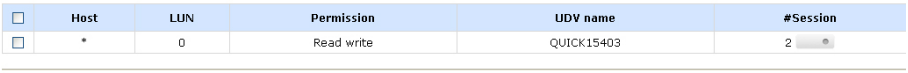
• CV control explained:

CREATE	Create a cache volume
DELETE	Delete a cache volume

4.6.5 Amount of logic units

Go to “Logical unit” to view number of Logic Units for each UDV. Click and select “ Attach ” to increase the number of LUN. “Host” must enter a name for the initiator for control or input wildcard “*”, which represents that every host can control this disk area. Select LUN and permission, and then click and select “ Confirm ”.





“Session” represents the number of users using this UDV.

• LUN control explained:

ATTACH	Attach a logical unit number to a user data volume
DETACH	Detach a logical unit number from a user data volume

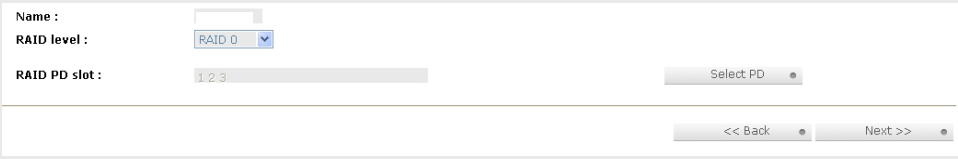
The rule for permission control starts from above and proceeds downwards and there are two requirements for UDV. Requirement number one: “*”, LUN 0. Requirement number two: “iqn.host1”, LUN 1. So when the other host, “iqn.host2” wants to perform access, it can login because it meets the first requirement.
If it does not meet the requirement, access will be denied.

4.6.6 Example

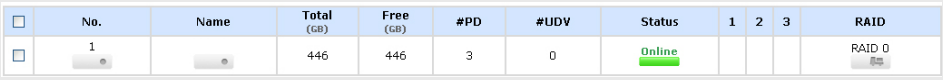
Below is an example for establishing a volume. In Example 1, 2 UDVs with shared global CV (global cache volume) will be established in addition to another shared disk. In Example 2, 2 UDVs will be established and 1 shared Cache Volume. For the other, a dedicated Cache Volume is used to configure a dedicated hard disk.

• Example 1
In Example 1, 2 UDVs will be established in 1 VG and each UDV uses shared Cache Volume. The shared Cache Volume will be automatically established after the system completes the booting process and thus there is not need to configure CV. Next, configure a shared hard disk. Finally, clear all configurations.

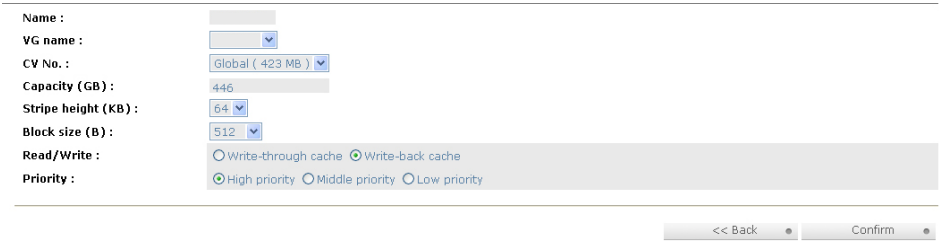
1) To establish VG (Volume Group)
To establish VG, refer to steps below:



a. Select “/ Volume config / Volume group”
b. Click and select “ Create ” “
c. First, enter a name for VG, and then select a RAID level in the menu and click and select “ Select PD ” to choose RAID Physical hard disk location and finally click and select “ Next >> ”.
d. Confirm the result. If the settings are correct click and select “ Confirm ”
e. The process is completed and a VG has been established.



2) Establish UDV (User Data Volume)
To establish 1 UDV, refer to the steps below:



a. Select "/ Volume config / User data volume"
b. Click and select " Create "
c. First, enter a name for the UDV and then select a VG name and enter the capacity of UDV. Then decide the capacity, block capacity, Read/Write and configure Priority. Finally click and select " Confirm "
d. The process is completed and a UDV has been established.
e. Repeat above steps to establish another UDV.

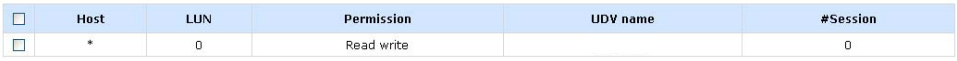
	No.	Name	Size (GB)	Status	1	2	3	R %	RAID	#LUN	VG name	CV (MB)
	1		100	Online	WB	HI			RAID 0	0	RADION	423

3) Add LUN for UDV
There are two ways of adding LUN to UDV

a. In "/ Volume config / User data volume", click and select " Attach "
b. In "/ Volume config / Logical unit", click and select " Attach "

The process is shown below:

c. Select a UDV
d. Enter "Host", which is a name used to control the initiator for this block. Or enter wildcard "*", which means that each host can control this block. Configure LUN and permission and then click and select " Confirm "
e. The process is completed.



	Host	LUN	Permission	UDV name	#Session
	*	0	Read write		0

Hint: The rule for permission proceeds downwards.

4) Set shared hard disk
To configure the shared hard disk refer to the steps below:

a. Select “/ Volume config / Physical disk”
b. Select box to check available space and then click and select “ Global spares ” and set it as shared space.
c. In status 1 field the system will display “GS” icon.

5) The process is completed and the disk can be used as an iSCSI.
To delete UDVs, VG, refer to the steps below:

6) Separate LUN from UDV
Go to “/ Volume config / Logical unit”

☐	Host	LUN	Permission	UDV name	#Session
☐	*	0	Read write		0

a. Click and select the selection box and place check next to the desired LUNs and then click and select “ Detach ” and a confirmation window will pop up.
b. Click and select “OK”
c. The process is completed.

7) Delete UDV (User Data Volume).
To delete UDV, follow steps below:

a. Select “/ Volume config / User data volume”
b. Click and select the selection box and place check next to the desired UDVs.
c. Click and select “ Delete ” and a confirmation page will pop up.
d. Select “OK”
e. The process is completed and the UDVs have been deleted.

Hint: After deleting UDV, the attached LUN(s) will be automatically separated.

8) Delete VG (Volume Group)
To delete VG, refer to the steps below:

a. Select “/ Volume config / Volume group”
b. Select the selection box and place a check next to the desired VG. Confirm the VG selected does not have UDV, or the UDV(s).
c. Click and select “ Delete ” and a confirmation Window will appear.
d. Click and select “OK”
e. The process is completed and the VG has been deleted.

Hint: The action for removing VG can only be performed when UDV(s) above have been deleted, or an error will occur when the VG is deleted.

9) Free shared volume hard disk
To free shared volume hard disk, please refer to the steps below:

a. Select “/ Volume config / Physical disk”
b. Click selection box to place a check next to the shared volume hard display and then click and select “ Free disks ” to free hard disk.

10) The process is completed and all the volumes have been deleted.

• Example 2

Here, we will establish 2 UDVs in one VG. One of the UDV is shared Cache Volume and the other uses dedicated Cache Volume.

First, the dedicated Cache Volume must be established, which will help establishing the UDV and then delete them.

Every UDV is associated with a special CV (cache volume) to perform data transmission. Each CV can have different Cache Volumes. If no special requests are placed in UDVs, the system will use shared Cache Volume, or the user can manually establish a dedicated Cache Volume for a single UDV. The performance of the dedicated Cache Volume will not be affected by other UDVs accessing data. The capacity for all Cache Volumes is determined by the capacity of RAM, and it will automatically be configured as shared. To configure a dedicated Cache Volume, first divide shared Cache Volume and give to dedicated Cache Volume to use. Refer to steps below:

1) Establish dedicated Cache Volume

a. Select “/ Volume config / Cache volume”.
b. If there isn’t enough space to establish a new dedicated Cache Volume, first click and select the “ Size 383 ” button in the capacity field and press the button to divide shared Cache Volume. After reconfiguring the capacity, click and select “ Confirm ” to go back to Cache Volume.
c. Click and select “ Create ” to enter configuration screen.
d. Enter the capacity and click and select “ Confirm ”.
e. The process is completed and the configuration for a new direct Cache Volume is completed.

Hint: The minimum capacity for shared Cache Volume is 40MB and the minimum capacity for dedicated Cache Volumes is 20 MB.

2) Establish VG (Volume Group)

Refer to Step 1 in Example 1 to establish a VG.

3) Establish UDV (User Data Volume).

Refer to Step 2 in Example 1 to establish a UDV.

To establish a UDV with dedicated Cache Volume, refer to steps below:

a. Select “/ Volume config / User data volume”.
b. Click and select “ Create ”.
c. First, enter a name for the UDV and select a name for VG and then select the dedicated Cache Volume established in step 1. Next, enter the capacity of UDV and determine the capacity, block capacity, Read/Write and also configure Priority. Finally click and select “ Confirm ”.
d. The process is completed and a UDV using dedicated cache has been established.

4) Add LUN for UDV.

Please refer to step 3 in example 1 to add LUN.

5) Configure dedicated hard disk

To configure a dedicated hard disk, follow the steps below:

a. Select “/ Volume config / Physical disk”
b. Select a VG from the menu and select the hard disk to be freed. Click and select “ Dedicated spares ” to configure the dedicated hard disk for the selected VG.
c. The “DS” icon will be displayed in status 1 field

	Slot	WWN	Size (GB)	VG name	Status	1	2	Speed
☐	1	2003001378a40c52	74		Good	GS		1.5Gb/s
☐	2	2027001378a40107	74		Good	RD		1.5Gb/s
☐	3	2004001378a406e4	74		Good	GS		3.0Gb/s
☐	4	2003001378a406e4	74		Good	RD		3.0Gb/s

Auto spindown : Disabled

6) The process is completed and PDs can be used like an iSCSI hard disk.
Delete UDVs, VG, refer to steps below:

7) Delete LUN from UDV
Refer to step 6 in example 1 to delete LUN.

8) Delete UDV (User Data Volume)
Refer to step 7 in example 1 to delete UDV

9) Delete VG (User Data Volume).
Refer to step 8 in Example 1 to delete VG

10) Free dedicated hard disk
To free dedicated hard disk, refer to steps below:

a. Select “/ Volume config / Physical disk”
b. Click the selection box and place a check next to the desired dedicated hard disk and then click and select “ Free disks ” to free hard disk.

11) Delete dedicated flash block
To delete dedicated flash block, refer to steps below:

a. Select “/ Volume config / Cache volume”
b. Click selection box to place a check next to CV.
c. Click and select “ Delete ” and a confirmation window will pop up.
d. Select “OK”
e. The process is completed and the CV has been deleted

Note: Shared Cache Volume cannot be deleted

12) The process is completed and all the blocks have been deleted

4.7 Enclosure management

“Enclosure management” function allows the administrator to manage or retrieve related information for hardware.

SES config	Access control for SES management
Hardware monitor	System monitored voltage, temperature and battery backup module
S.M.A.R.T.	Self-monitoring analysis and reporting technology for physical disks
UPS	Uninterruptible power supply

4.7.1 SES structure

SES refers to SCSI Enclosure Services. Go to “SES config” function to activate or close SES management.

	Host	LUN	Permission	UDV name
☐	*	0	Read write	(SES)

The application software for SES user can be downloaded at the site below:
SANtools: http://www.santools.com/

4.7.2 Hardware information

Go to “Hardware Monitor” function to check the current voltage and temperature.

Item	Information
+1.35V:	+1.36 V (min = +1.28 V, max = +1.47 V)
+3.3V:	+3.44 V (min = +3.03 V, max = +3.63 V)
+5V:	+5.14 V (min = +4.50 V, max = +5.50 V)
+12V:	+12.16 V (min = +10.80 V, max = +13.20 V)
+2.5V:	+2.61 V (min = +2.35 V, max = +2.85 V)
Core Processor:	+52.0 (C) (hyst = +0.0 (C), high = +70.0 (C))
Location 1:	+47.0 (C) (hyst = +0.0 (C), high = +65.0 (C))
Location 2:	+41.0 (C) (hyst = +0.0 (C), high = +65.0 (C))

Auto shutdown : ☑

If you check “Auto shutdown” function, the system will close when the voltage and temperature goes above the normal range. For optimum protection of data, please check “Auto Shutdown” function.

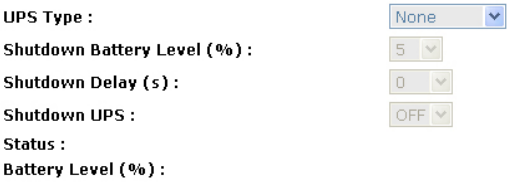
4.7.3 Support hard disk S.M.A.R.T. function

S.M.A.R.T. (Self-Monitoring Analysis and Reporting Technology) is a hard disk diagnostic tool and provides warnings before hard disk errors. It provides an opportunity for prevention before the hard disk is damaged.
S.M.A.R.T. tests the many attributes of the hard disk at any time and evaluate if the capacity limit is being reached. Advanced notifications of damaged hard disk allow you to backup the disk or replace it with new hard disk, which is much superior to damaging data while accessing or reconstruct a damaged hard disk.
Go to “S.M.A.R.T.” function and it will display the S.M.A.R.T. information for the hard disk. The number represents the current value and the value inside the parentheses represents the default value.
The default value for each brand is different from one another. For detailed information refer to the specification explanation of the brand.

Slot	Read error rate	Spin up time	Reallocated sector count	Seek error rate	Spin up retries	Calibration retries	Temperature (C)	Status
1	200(51)	161(21)	200(140)	200(51)	100(51)	100(51)	35	Good
2	200(51)	161(21)	200(140)	200(51)	100(51)	100(51)	37	Good
3	103(6)	85(0)	100(36)	55(30)	100(97)		44	Good
4	100(6)	97(0)	100(36)	59(30)	100(97)		43	Good

4.7.4 UPS

Go to “UPS” function to UPS (Uninterruptible Power Supply).



Currently the system only supports the smart-UPS function of the UPS from APC (American Power Conversion Corp.). Refer to this address for detailed information: http://www.apc.com/.
First, connect system and APC UPS using RS-232. Next, configure the Shutdown value when the power is disconnected. You can use the UPS from other brands but they don't have this function.

UPS Type	Select UPS Type. Choose Smart-UPS for APC Smart-UPS or choose “None” for other vendors.
Shutdown Battery Level (%)	When below the specified level, the system will shut down automatically. Setting the value to “0” will disable the UPS function.
Shutdown Delay (s)	If power failure occurs, and the system cannot return back after the specified period of time, the system will shut down automatically. Setting the value to “0” will disable this function.
Shutdown UPS	If ON is selected, when power is gone, UPS will shut down automatically after the system shuts down successfully. After power comes back, UPS will start working and notify the system to boot up. Selecting “OFF” will disable this function.
Status	The status of UPS. “Detecting…” “Running” “Unable to detect UPS” “Communication lost” “UPS reboot in progress” “UPS shutdown in progress” “Batteries failed. Please change them NOW!”
Battery Level (%)	Current percentage of battery power.

4.8 System maintenance

The “Maintenance” function allows the administrator to perform maintenance to system functions.

Upgrade	Remote upload firmware
Info	System information
Reset to default	Reset to factory default
Config import & export	Import/export configurations
Shutdown	Reboot or shutdown system

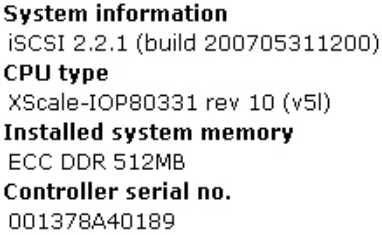
4.8.1 Firmware upgrade

Go to “Upgrade” to update firmware. Prepare the "xxxx.bin” file for your new version of firmware and then click and select “ Browse... " select the file. After clicking and selecting " Confirm “, the system will automatically complete the update.
A status window will appear when updating firmware. You'll need to reboot after completing the update process.
You can click and select “Export config” to store the current system config file or restore the previous config file.

Hint: If your hardware usage is normal, you do not have to update firmware to avoid any abnormality after updating. Updating firmware may cause the configuration of the system to be lost or even cause data loss, which Sans Digital will not be responsible. For any firmware updating needs, please contact tech@sansdigital.com to get the latest firmware version.

4.8.2 System information

Click and select” Info” and the current System information will be displayed

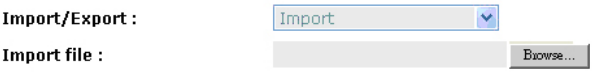


4.8.3 Restore default value

Click and select "Reset to default” to restore the system to its default value.

4.8.4 Config import and export

Click and select "Congif import & export" to import / export config file.



4.8.5 Shutdown

Go to “Shutdown” and the system will display REBOOT and SHUTDOWN buttons. Before turning off the power, click and select SHUTDOWN to clear the cache on the Physical hard disk. That action is rather helpful for the protection of your data.

4.9 Logout

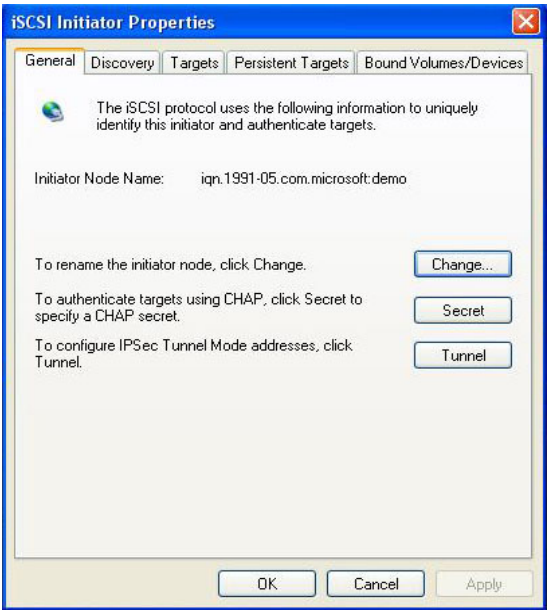
For security, "Logout” function allows the system to logout without the user. When login again, enter the user name and password.

4.10 Configure Microsoft iSCSI

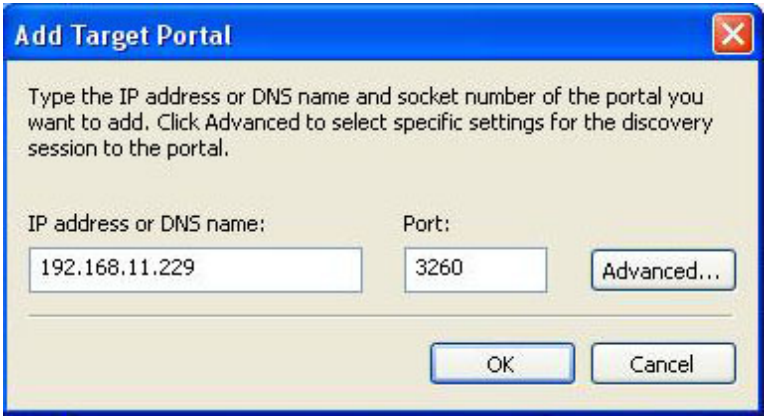
Configure Steps of Microsoft iSCSI

1) Run Microsoft iSCSI Initiator

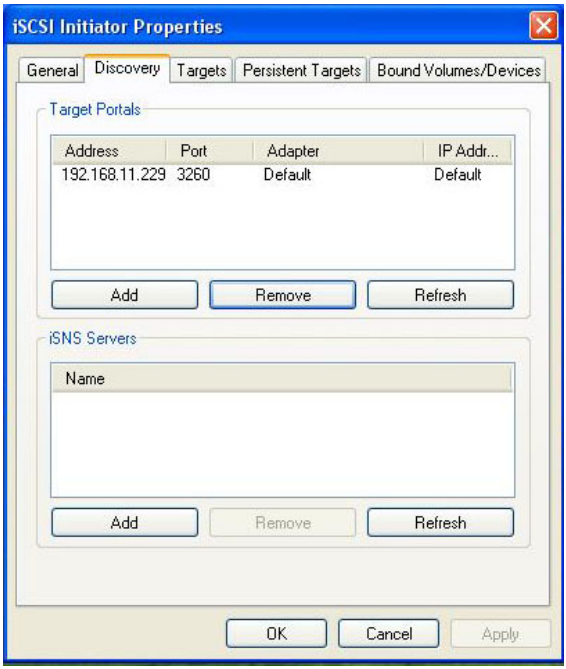
2) Click and select “Discovery”.



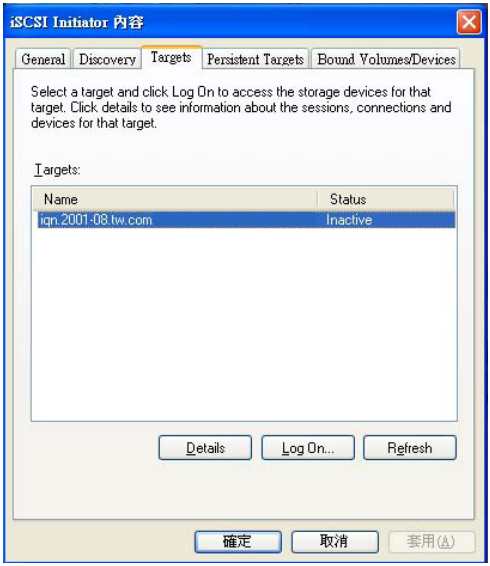
3) Click and select “Add”. Enter IP Address or the DNS name for iSCSI device.


Add Target Portal
Type the IP address or DNS name and socket number of the portal you want to add. Click Advanced to select specific settings for the discovery session to the portal.
IP address or DNS name:
Port:
192.168.11.229
3260
Advanced...
OK
Cancel

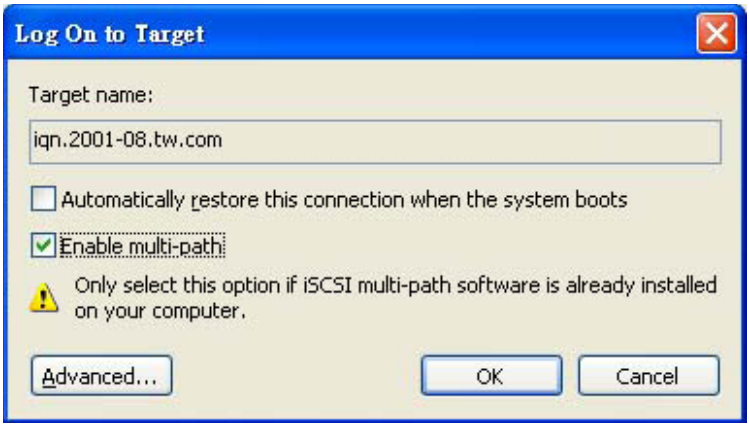
4) Click and select “OK”



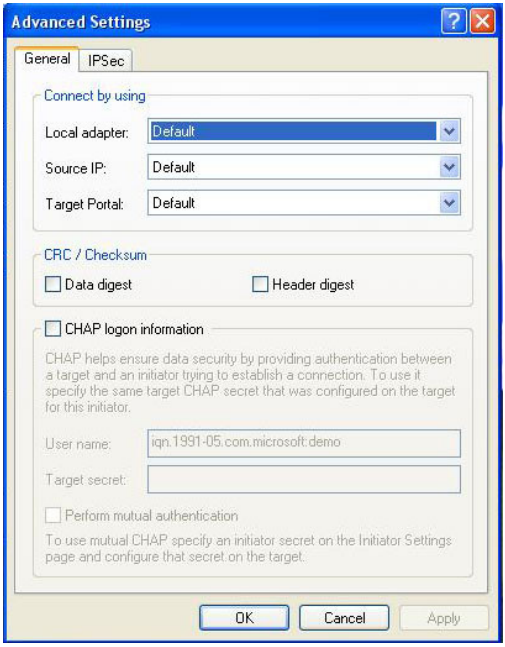
5) Click and select “Targets”.



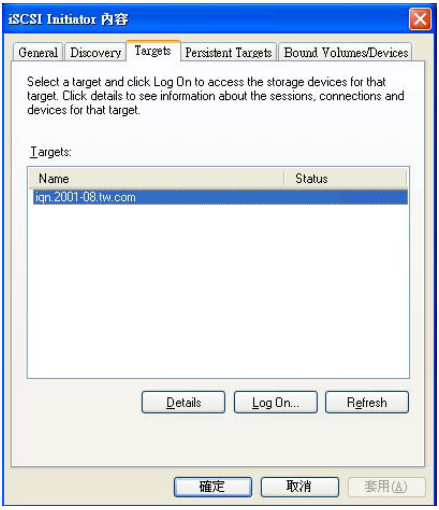
6) To run MPIO click and select “Log On” and then check “Enable multi-path”.



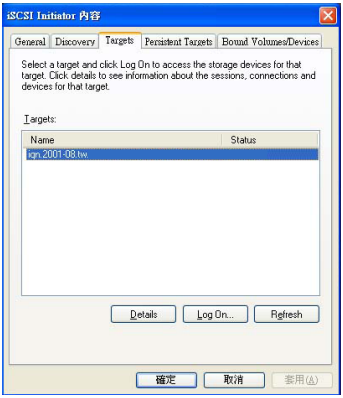
7) For CHAP information click and select “Advance”.


Advanced Settings
General
IPSec
Connect by using
Local adapter:
Default
Source IP:
Default
Target Portal:
Default
CRC / Checksum
Data digest
Header digest
CHAP logon information
CHAP helps ensure data security by providing authentication between a target and an initiator trying to establish a connection. To use it specify the same target CHAP secret that was configured on the target for this initiator.
User name:
iqn.1991-05.com.microsoft:demo
Target secret:
Perform mutual authentication
To use mutual CHAP specify an initiator secret on the Initiator Settings page and configure that secret on the target.
OK
Cancel
Apply

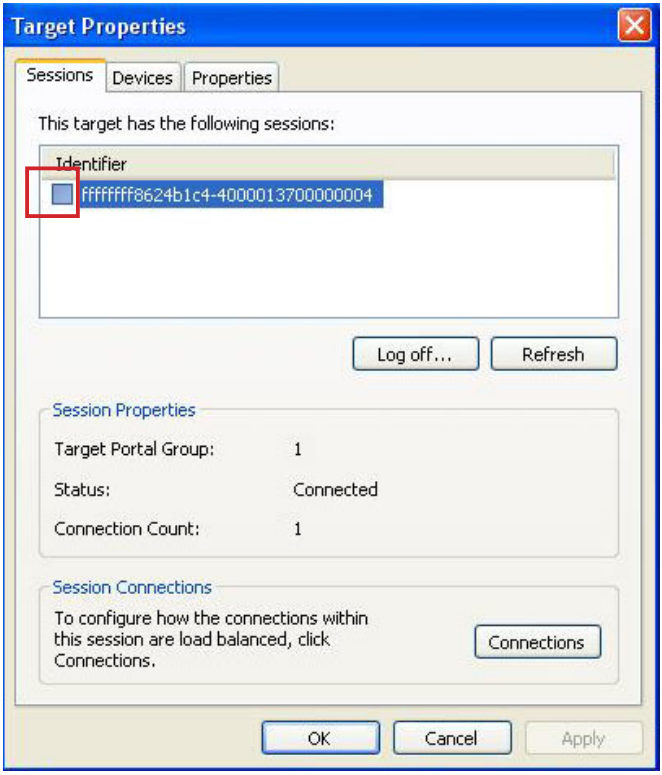
8) If the status is “Connected” that means the iSCSI has been connected. Click and select “OK” to use the system.



9) Below explains steps to remove iSCSI device. First, click and select “Details”.



10) Then check the item to remove.



11) Next, click and select “Log off”.

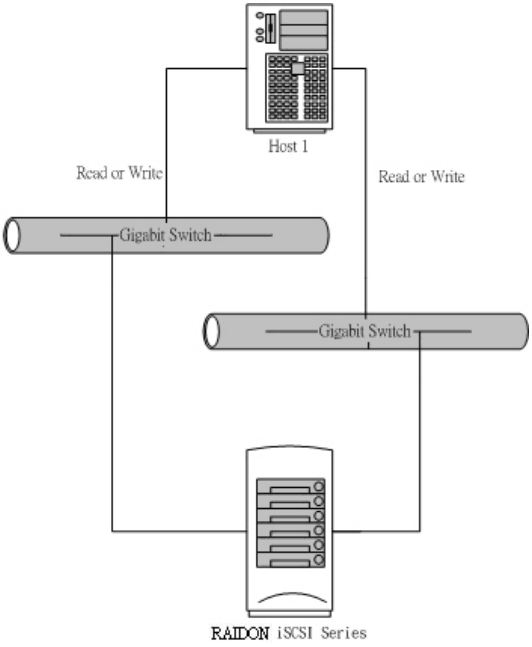
12) The system executes and the iSCISI is removed.

4.11 Configure MPIO and MC/S

This process configures MPIO and there are 2 methods: 1. General use, 2. Recommended use (better performance).

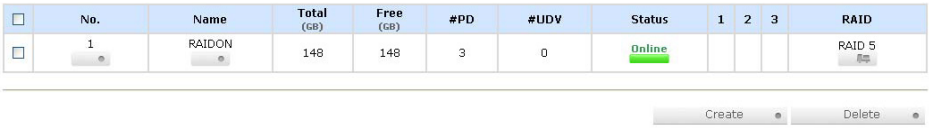
1) Network diagram of MPIO.

1. Dual ports with MPIO (Direct connect, host has 2 LAN ports, read or write in one UDV)



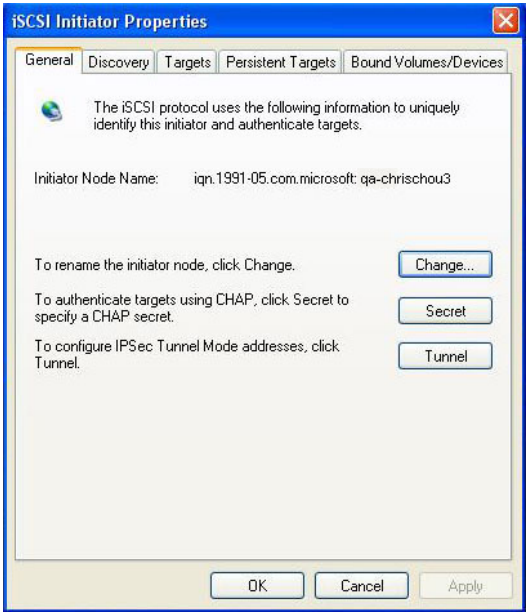
2. Dual ports with MPIO (Via switches, host has 2 LAN ports, read or write in one UDV)

2) Refer to the illustration below for configuration method.
Establish VG under RAID 5 and use 3 hard disks (the number of hard disks required differs according to the models)



3) Establish UDV under RAID 5 VG

4) Run Microsoft iSCSI initiator and confirm the Node Name for the initiator.



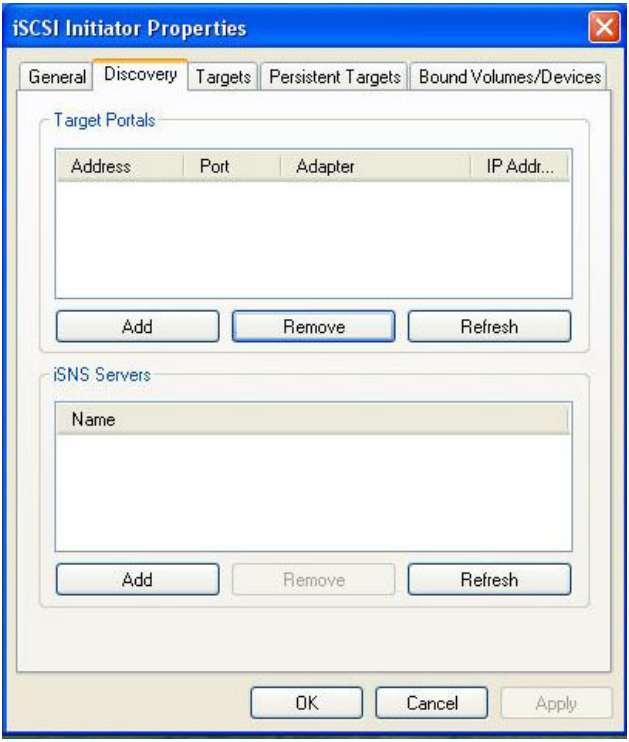
5) At R5 UDV attached with LUN enters Initiator Node Name at "Host" (refer 4.11 Step 4)

6) Complete capacity configuration.

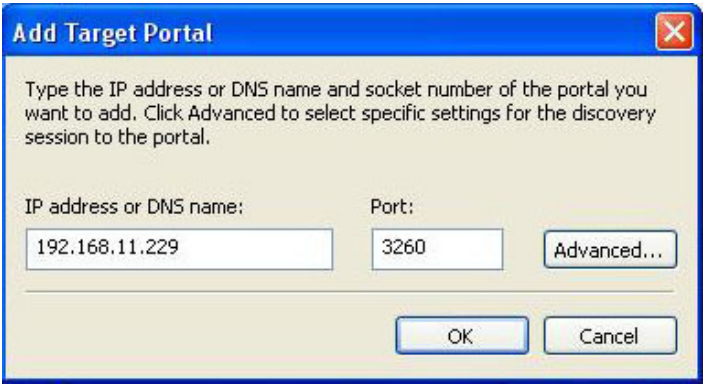
7) Confirm iSCSI device. Confirm iSCSI's IP Addresses: port 0 is 192.168.11.229, port 1 is 192.168.12.229

Name	DHCP	IP address	Netmask	Gateway	MTU	MAC address	Link
LAN1	no	10.1.2.126	255.255.255.0	10.1.2.1	1500	00:13:78:04:08:62	up
LAN2	no	192.168.2.1	255.255.255.0	192.168.2.254	1500	00:13:78:04:08:63	down

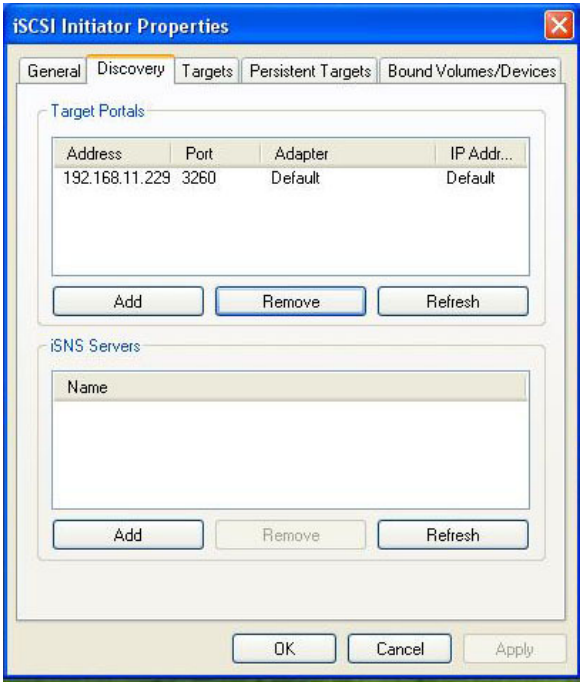
8) Add Target Portals under Microsoft iSCSI initiator



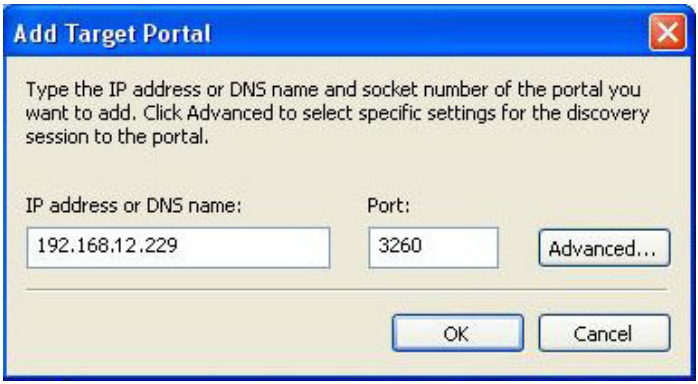
9) Enter IP Address (192.168.11.229) at iSCSI data port 0.


Add Target Portal
Type the IP address or DNS name and socket number of the portal you want to add. Click Advanced to select specific settings for the discovery session to the portal.
IP address or DNS name:
Port:
192.168.11.229
3260
Advanced...
OK
Cancel

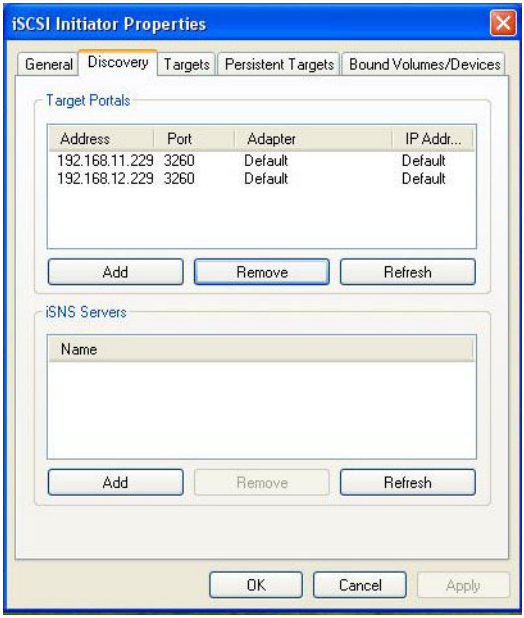
10) Add a 2nd Target Portal under Microsoft iSCSI initiator.



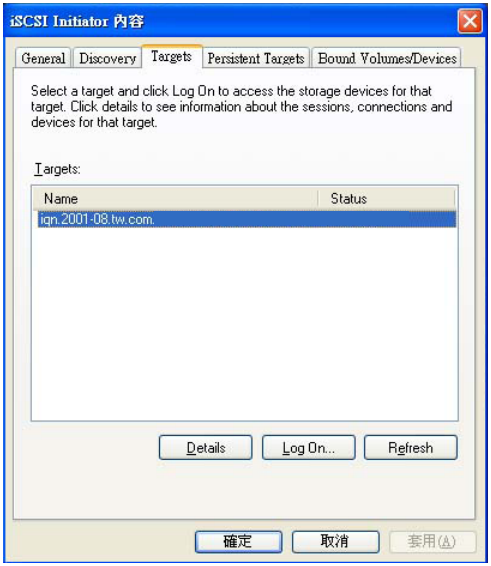
11) IP Address (192.168.12.229) at iSCSI data port 1


Add Target Portal
Type the IP address or DNS name and socket number of the portal you want to add. Click Advanced to select specific settings for the discovery session to the portal.
IP address or DNS name:
Port:
192.168.12.229
3260
Advanced...
OK
Cancel

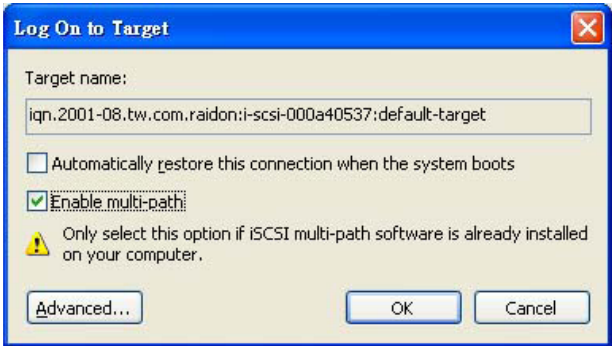
12) Initiator configuration is complete.



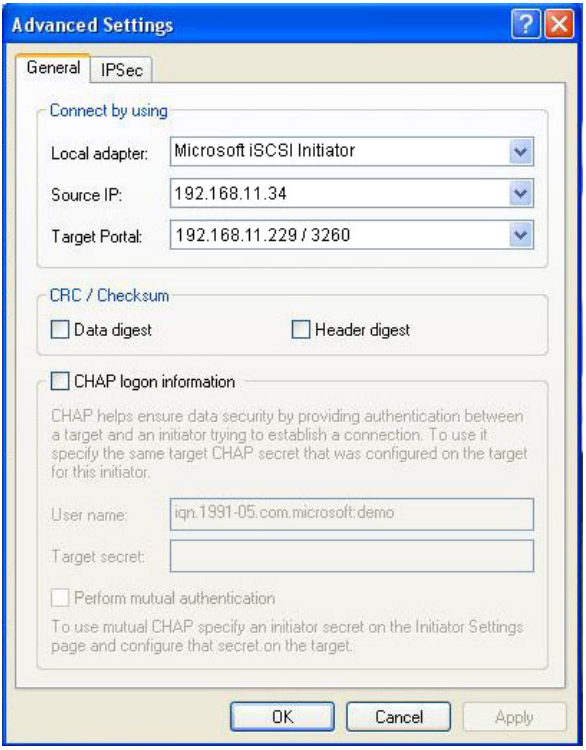
13) Click and select Log On.



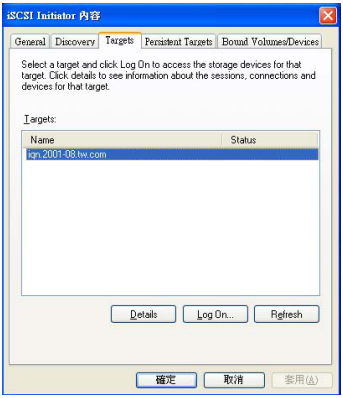
14) First, Select “Enable multi-path”, and then click and select "Advanced”.



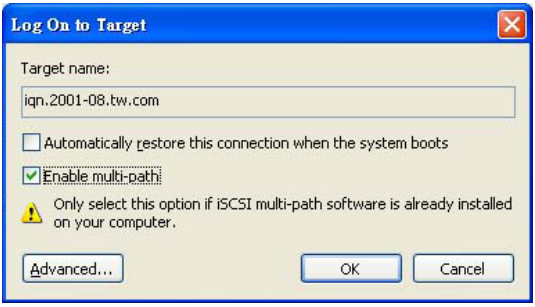
15) Select Target Portal port 0 (192.168.11.229). Then click and select “OK”


Advanced Settings
General
IPSec
Connect by using
Local adapter:
Microsoft iSCSI Initiator
Source IP:
192.168.11.34
Target Portal:
192.168.11.229 / 3260
CRC / Checksum
Data digest
Header digest
CHAP logon information
CHAP helps ensure data security by providing authentication between a target and an initiator trying to establish a connection. To use it specify the same target CHAP secret that was configured on the target for this initiator.
User name:
iqn.1991-05.com.microsoft:demo
Target secret:
Perform mutual authentication
To use mutual CHAP specify an initiator secret on the Initiator Settings page and configure that secret on the target.
OK
Cancel
Apply

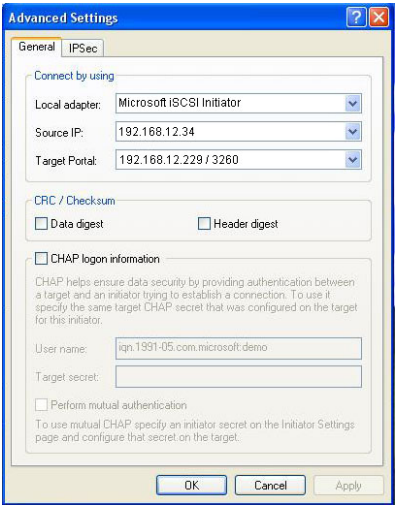
16) Then, register another IP.



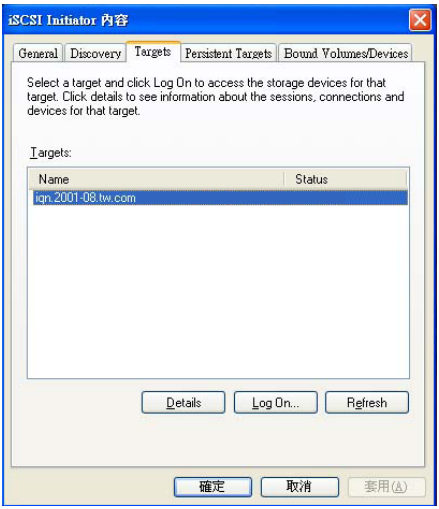
17) First, select “Enable multi-path” and then click and select “Advanced”



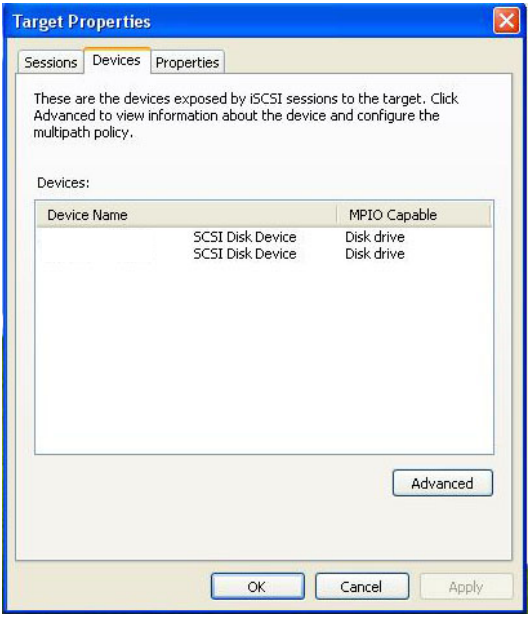
18) Select Target Portal port 1 (192.168.11.229). Then Click and select “OK”


Advanced Settings
General
IPSec
Connect by using
Local adapter:
Microsoft iSCSI Initiator
Source IP:
192.168.12.34
Target Portal:
192.168.12.229 / 3260
CRC / Checksum
Data digest
Header digest
CHAP logon information
CHAP helps ensure data security by providing authentication between a target and an initiator trying to establish a connection. To use it specify the same target CHAP secret that was configured on the target for this initiator.
User name:
iqn.1991-05.com.microsoft:demo
Target secret:
Perform mutual authentication
To use mutual CHAP specify an initiator secret on the Initiator Settings page and configure that secret on the target.
OK
Cancel
Apply

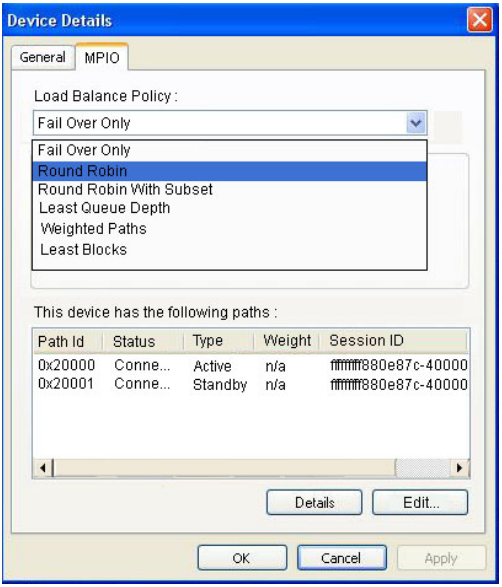
19) After connecting iSCSI device, click and select "Details”.



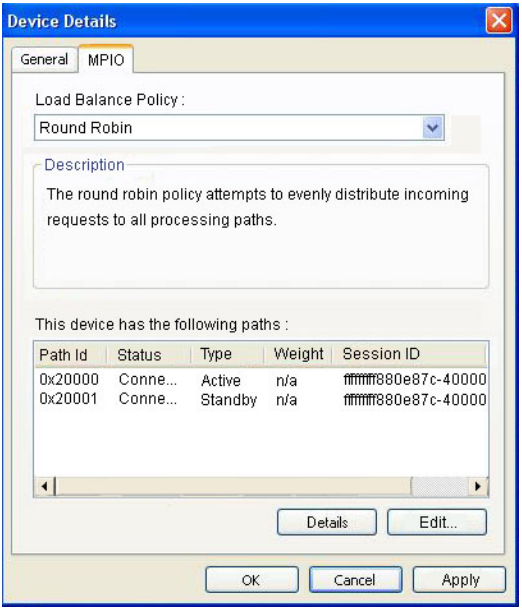
20) Click and select “Device”, and then click and select “Advanced”.



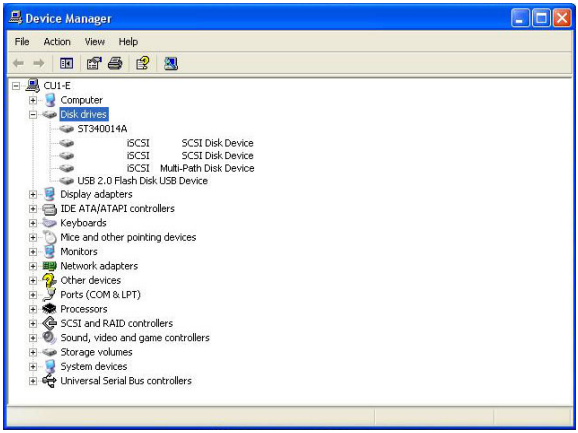
21) Click and select “MPIO”, select “Round Robin” under “Load Balance Policy”.



22) Click and select “Apply”.

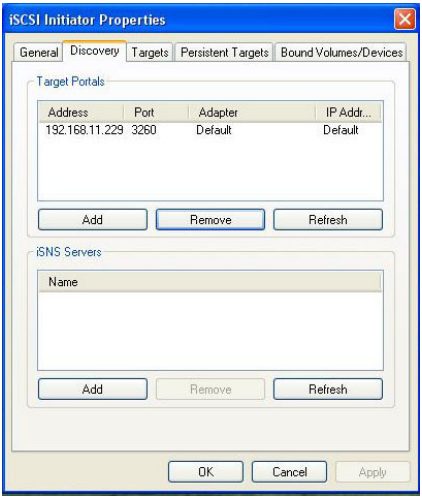


23) Run "Device Manager" in Windows and confirm MPIO functions. Then use IOMETER to do performance test.

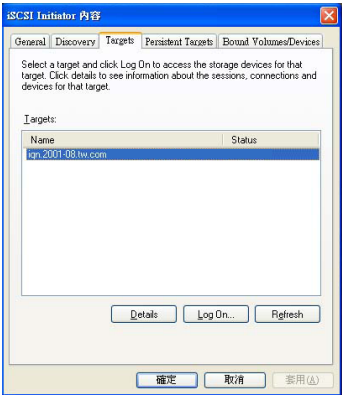


4.12 For configuring MC/S and MPIO (they're similar) refer to configuring MPIO

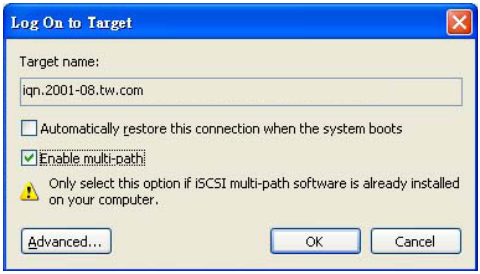
1) Use 3 hard disks to establish VG and RAID 5.
2) Use RAID 5 VG to establish UDV.
3) Run Microsoft iSCSI initiator 2.0 and confirm Initiator Node Name.
4) At R5 UDV attached with LUN enter Initiator Node Name at Host field.
5) The process for setting volume is complete.
6) Confirm iSCSI device. Confirm iSCSI's IP Addresses such as port 0 is 192.168.11.229, and port 1 is 192.168.12.229
7) Add Target Portals at Microsoft iSCSI initiator 2.0
8) Enter IP Address (192.168.11.229) at iSCSI data port 0
   For MC/S, there is only ONE "Target Portal" in the "Discovery" tab.



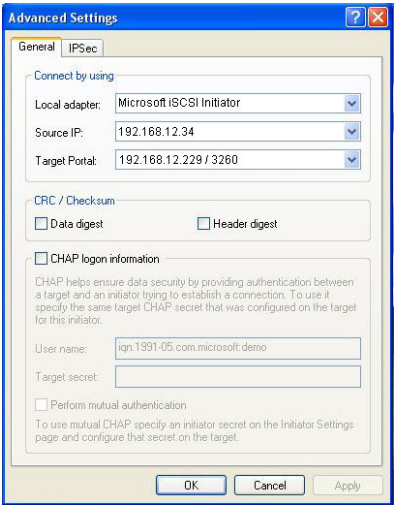
9) Click and select Log On.



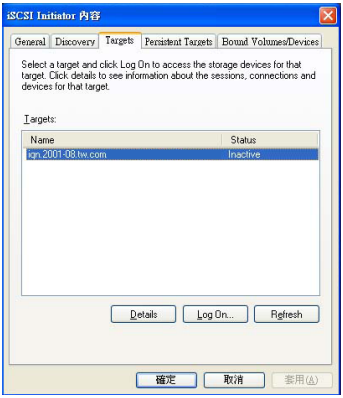
10) Click and select “Advanced”.



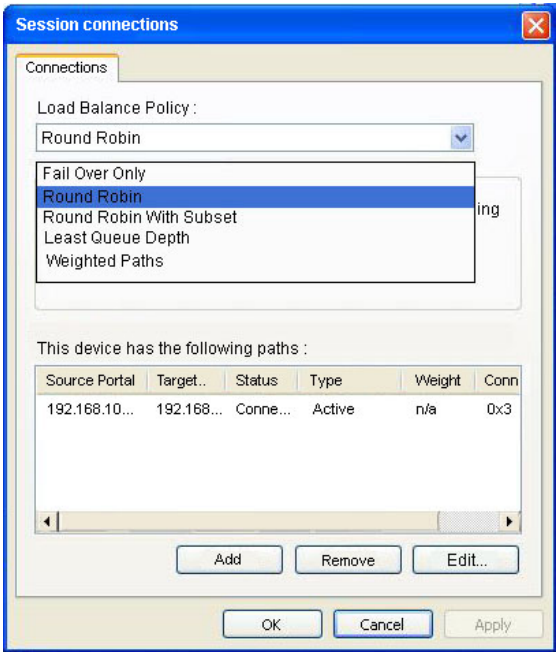
11) Select and configure iSCSI port 0's Local Adapter, Source IP, and Target Portal (192.168.11.229), and then click and select “OK”.


Advanced Settings
General
IPSec
Connect by using
Local adapter:
Microsoft iSCSI Initiator
Source IP:
192.168.12.34
Target Portal:
192.168.12.229 / 3260
CRC / Checksum
Data digest
Header digest
CHAP logon information
CHAP helps ensure data security by providing authentication between a target and an initiator trying to establish a connection. To use it specify the same target CHAP secret that was configured on the target for this initiator.
User name:
iqn.1991-05.com.microsoft:demo
Target secret:
Perform mutual authentication
To use mutual CHAP specify an initiator secret on the Initiator Settings page and configure that secret on the target.
OK
Cancel
Apply

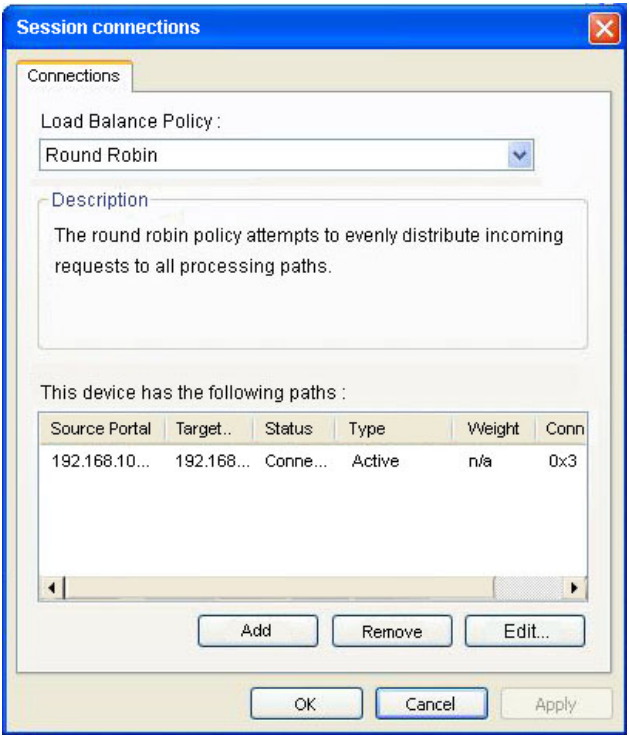
12) After finishing the connection click and select "Connections" under "Details".

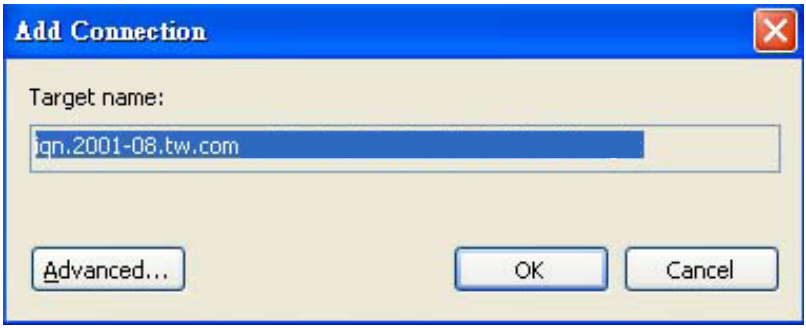


13) Select "Round Robin"

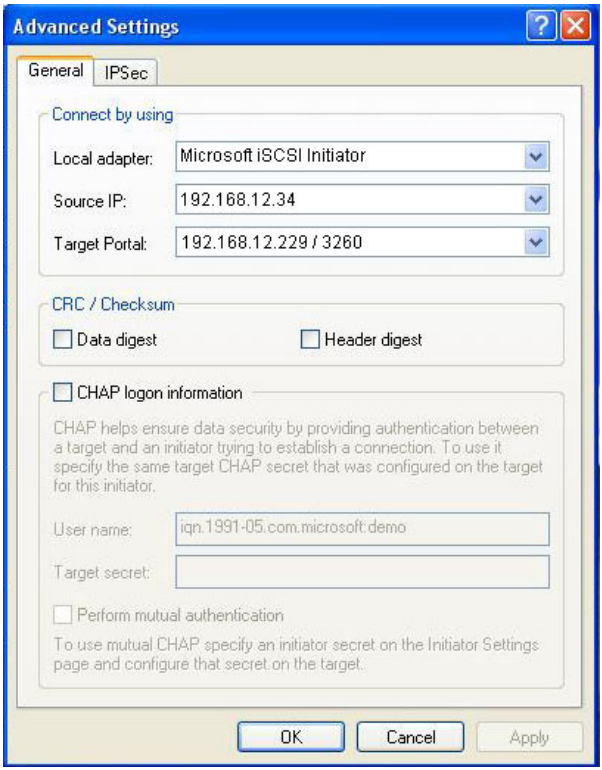


14) Add iSCSI's data source, which is port 1(192.168.12.229).





15) Select and configure iSCSI port 1's Local Adapter, Source IP, and Target Portal (192.168.11.229) and then click and select “OK”


Advanced Settings
General
IPSec
Connect by using
Local adapter:
Microsoft iSCSI Initiator
Source IP:
192.168.12.34
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CHAP logon information
CHAP helps ensure data security by providing authentication between a target and an initiator trying to establish a connection. To use it specify the same target CHAP secret that was configured on the target for this initiator.
User name:
iqn.1991-05.com.microsoft:demo
Target secret:
Perform mutual authentication
To use mutual CHAP specify an initiator secret on the Initiator Settings page and configure that secret on the target.
OK
Cancel
Apply

16) Complete the setting for MC/S

Chapter 5 Advanced Operations

5.1 Data rebuild

In a VG with the RAID level protection configured (such as RAID 3, RAID 5 or RAID 6), if a Physical hard disk has an error, is not plugged in or is removed, the status of VG will change and system will search for remaining available space to reconstruct data to ensure the completeness of data. It will prioritize the use of dedicated space for rebuilding disk space and share disk second.
AccuRAID AR108I series products support data automatically rebuild function. When RAID level permits disk error and the VG is protected, such as RAID 3, RAID5, and RAID6, AccuRAID AR108I series products will reconstruct data according to the situations below:

Using RAID 6 as example:

1) When the system does not have shared or dedicated space, AccuRAID AR108I series products will enter degrade mode and wait until (A), a hard disk has been designated as hard disk space or (B), the damaged hard disk is replaced with a new hard disk, before the data rebuild begins. The new disk will automatically become the disk space for original VG.

2) If the newly added hard disk isn't empty (there is other unknown VG information), it will be labeled as RS (reserved), and the system will not automatically perform data rebuild.

3) If the disk belongs to other existing VG, it will be treated as FR (Free) disk, and the system will automatically start data rebuild.

4) When there is enough shared space or dedicated, AccuRAID AR108I series products will immediately
start data rebuild. On RAID 6 level, during data rebuild, if another disk fails, AccuRAID AR108I series products will still complete the data rebuild started above. The automatic data rebuild only works when the system is operating, which means the process will not conflict with roaming. In degrade status; the status of VG is “DG”. During data rebuild, the status of PD/VG/UDV will show “R”, and the “R%” in UDV will display percentage. After the completion of data rebuild, statuses “R” and “DG” will disappear and the VG will be restored to a complete VG.

Note: If there are no VGs or there are only RAID 0, or JBOD's VG, there will be no menu because for user cannot configure dedicated space for these RAID levels. Sometimes a rebuild is called restoration, but these terms mean the same thing. The chart below shows the relationship between RAID level and rebuild.

RAID 0	(striping). No data protection. Data is damaged or inaccessible if any hard disk fails or is unplugged.
RAID 1	(mirroring). Allows one hard disk to fail or being unplugged. One new hard disk is required to insert to the system to complete the rebuilding.
N-way mirror	Extension of RAID 1 level. It has N copies of the disks and allows N-1 hard disks to fail or being unplugged.
RAID 3	(striping with parity). Allows one hard disk to fail or being unplugged.
RAID 5	(striping with interspersed parity). Allows one hard disk to fail or being unplugged.
RAID 6	(2-dimensional parity protection). RAID 6 allows two hard disks to fail or being unplugged. If two hard disks need to be rebuilt at the same time, it will rebuild the first one and then the other one.
RAID 0+1	(mirroring of the member RAID 0). Allows two hard disks to fail or being unplugged, but the hard disks must in the same array.
RAID 10	(striping over the member RAID 1). Allows two hard disks to fail or being unplugged, but the hard disks must in different array.

RAID 30	(striping over the member RAID 3). Allows two hard disks to fail or being unplugged, but the hard disks must in different array.
RAID 50	(striping over the member RAID 5). Allows two hard disks to fail or being unplugged, but the hard disks must in different array.
RAID 60	(striping over the member RAID 6). Allows four hard disks to fail or being unplugged, but each two hard disks must in different array.
JBOD	The abbreviation of “Just a Bunch Of Disks”. No data protection. Data is damaged or inaccessible if any hard disk fails or is unplugged.

5.2 Migrate and expand VG

To migrate RAID level, refer to steps below. If migrating VG to the original VG with the same RAID level, the process will be seen as expansion.

1) Click and select“/ Volume config / Volume group”

2) Select VG to be migrated, click and select “ " button in RAID field.

3) Using pull down menu “ RAID 5 " to change RAID level. If there is not enough space on the hard disk to support new RAID level, a dialog window will pop out, click and select “ Select PD " to increase hard disk and then click and select “ Confirm " to go back to the configuration page. If migrating to lower RAID level, for example, migrating from RAID 6 to RAID 0 and the system will evaluate if doing it this way is safe and display the warning "Sure to migrate to a lower protection array? ”

4) Confirm setting again, if everything is OK, click and select “ Next >> ".

5) The last confirm page will display detailed information for RAID. If everything is OK, click and select “ Confirm " to migrate.

6) You can see the progress for migration in “Status 3” field and the system will display "M" and in “/ Volume config / User data volume”, status "M" and completion percentage "R%" will be displayed in “Status 3” field.

	No.	Name	Total (GB)	Free (GB)	#PD	#UDV	Status	1	2	3	RAID
☐	1		222	0	3	1	Online			M	RAID 0

Hint: To migrate or expand, the total capacity VG should be larger or equal to the original VG. Hard disks with the same RAID level and same original VG aren't allowed to expand.
When configuring migration, if the user setting isn't accurate, the system will display a warning window, below explains the meanings:
"Invalid VG ID": source VG error
"Degrade VG not allowed": source VG was degraded
"Initializing/rebuilding operation's going": the source VG is being initialized or rebuilt
"Migration operation's going": source VG is being migrated
"Invalid VG raidcell parameter": false structure. For example, the capacity of the new VG is smaller than the capacity of the original VG.
"Invalid PD capacity": the minimum PD capacity of the new VG is smaller than the original VG's minimum PD capacity.

Note: during data rebuild or UDV expansions, VG migration cannot be performed.

5.3 UDV expansion

Refer to steps below to perform UDV expansion.

1) Select “/ Volume config / User data volume”

2) Select the UDV to expand and click and select the “ ” button next to the numbers in the large and small field.

3) Change the size of capacity. Ensure the size of capacity must be larger than the original value and then click and select “ " to expand.

4) The expansion process will begin. If UDV has to be initialized, at the “Status 3” the system will display “I”, and displays the completed percentage “R%”.

Hint: The expansion capacity of UDV must be larger than the original value

Note: UDV expansion cannot be done during data rebuild or migration

5.4 Disc roaming

Physical hard disk can be realigned or moved from system 1 to system 2 completely and that is called Disc roaming. The restrictions for Disc roaming are listed below:

1) First, check the firmware versions for both systems. It is best if they have the same firmware versions or updated versions.

2) The VGs for the entire Physical hard disk must be migrated together. The structure of VG and UDV will be retained, but the LUN structure will be removed to avoid conflict with system 2.

5.5 Support Microsoft MPIO and MC/S

MPIO (Multi-Path Input/Output) and MC/S (Multiple Connections per Session) uses multiple physical paths to produce logical paths between the server and the storage device. Generally, when one or more connections are disconnected the transmission will be interrupted, but the user of MPIO can ensure data access through rotating access.
Microsoft's iSCSI initiator supports MPIO function; refer to steps below to use MPIO function.

1) Connect the host with double LAN ports to AccuRAID AR108I series products.

2) Establish one VG/UDV and connect this UDV to host

3) When installing “Microsoft iSCSI initiator", please install MPIO driver as well

4) Login both port into target. When login, please confirm “Enable multi-path”.

5) MPIO mode can be selected in Targets Details Devices Advanced

6) Scan disk again

7) One disk will run MPIO. For detailed configuration refer to 4.12. MPIO and MC/S. The configuration of MC/S is very similar to MPIO.

Chapter 6 Applications

Because AccuRAID AR108I series products have twin Gigabit channel design, their range of application is wider. Below are some examples:

6.1 Resource sharing

See AccuRAID AR108I series products as one of the members in the network; establish a LAN and when all the PCs in the network is installed with an initiator, then the AccuRAID AR108I series products can be used as local hard disks.
The benefits of connecting this way is all the PCs see AccuRAID AR108I series products as its own hard disks and so you can install authorized software to AccuRAID AR108I series products and then share with other PCs, which is convenient, safe, and helps to reduce software cost!

Note: In the same LAN, the hardware configuration for the PCs sharing AccuRAID AR108I series products must be the same and have to install initiators. When two or more PC is trying to save the same file, file errors can occur easily. It is recommended that the proper permission is given.

6.2 Off-site access

Because AccuRAID AR108I series product is built on networks, therefore it has the same advantage of a network, which is not restricted by locations. Configure the proper IP addresses and permissions and you can connect to AccuRAID AR108I series product anywhere in the world for data access or configurations.

Appendix

A. Certification list

• RAM
RAM Spec: 184pins, DDR333(PC2700), Reg.(register) or UB(unbuffer), ECC or Non-ECC.

Vendor	Model
Unigen	UG732D6688KN-DH, 256MB DDR333 (UB)
Unigen	UG732D7588KZ-DH, 256MB DDR333 (Reg, ECC)
Unigen	UG764D7588KZ-DH, 512MB DDR333 (Reg, ECC)
Unigen	UG7128D7588LZ-DH, 1GB DDR333 (Reg, ECC)
Unigen	UG732D6688KS-DH, 256MB DDR333 (UB)
Unigen	UG764D6688LS-DH, 512MB DDR333 (UB)
Trenscend	256MB DDR333 (Reg ECC)
Trenscend	512MB DDR333 (Reg ECC)
Trenscend	1GB DDR333 (Reg ECC)

• iSCSI HBA card

Vendor	Model
Adaptec	7211C (Gigabit, 1 port, TCP/IP offload, iSCSI offload)
QLogic	QLA4010C (Gigabit, 1 port, TCP/IP offload, iSCSI offload)

• NIC

Vendor	Model
Intel	PWLA8490MT (Gigabit, 1 port, TCP/IP offload)
Intel	PWLA8492MT (Gigabit, 2 port, TCP/IP offload)
Intel	PWLA8494MT (Gigabit, 4 port, TCP/IP offload)

• SATA hard drive

Vendor	Model
Hitachi	Deskstar 7K250, HDS722580VLSA80, 80GB, 7200RPM, SATA, 8M
Hitachi	Deskstar 7K80, HDS728080PLA380, 80GB, 7200RPM, SATA-II, 8M
Hitachi	Deskstar 7K500, HDS725050KLA360, 500G, 7200RPM, SATA-II, 16M
Hitachi	Deskstar 7K80, HDS728040PLA320, 40G, 7200RPM, SATA-II, 2M
Maxtor	DiamondMax Plus 9, 6Y080M0, 80G, 7200RPM, SATA, 8M
Maxtor	DiamondMax 11, 6H500F0, 500G, 7200RPM, SATA 3.0Gb/s, 16M
Samsung	SpinPoint P80, HDSASP0812C, 80GB, 7200RPM, SATA, 8M
Seagate	Barracuda 7200.7, ST380013AS, 80G, 7200RPM, SATA, 8M
Seagate	Barracuda 7200.7, ST380817AS, 80G, 7200RPM, SATA, 8M, NCQ
Seagate	Barracuda 7200.8, ST3400832AS, 400G, 7200RPM, SATA, 8M, NCQ
Seagate	Barracuda 7200.9, ST3500641AS, 500G, 7200RPM, SATA-II, 16M
Western Digital	Caviar SE, WD800JD, 80GB, 7200RPM, SATA, 8M
Western Digital	Caviar SE, WD1600JD, 160GB, 7200RPM, SATA, 8M
Western Digital	Raptor, WD360GD, 36.7GB, 10000RPM, SATA, 8M

Western Digital	Caviar RE2, WD4000YR, 400GB, 7200RPM, SATA, 16M, NCQ

B. Event notifications

• PD/S.M.A.R.T. events

Level	Type	Description
Info	Disk inserted	Info: Disk <slot> is inserted.
Info	Disk removed	Info: Disk <slot> is removed.
Warning	S.M.A.R.T. threshold exceed condition	Warning: S.M.A.R.T. threshold exceed condition occurred.

• Physical HW events

Level	Type	Description
Warning	ECC error	Warning: Single-bit ECC error is detected.
Error	ECC error	Error: Multi-bit ECC error is detected.
Info	ECC DIMM Installed	Info: ECC Memory is installed.
Info	Non-ECC installed	Info: Non-ECC Memory is installed.
Error	Host chip failure	Error: Host channel chip failed.
Error	Drive chip failure	Error: Drive channel chip failed.
Warning	Ethernet port failure	Warning: GUI Ethernet port failed.

• HDD IO events

Level	Type	Description
Warning	Disk error	Error: Disk <slot> read block error.
Warning	Disk error	Error: Disk <slot> writes block error.
Warning	HDD failure	Error: Disk <slot> is failed.
Warning	Channel error	Error: Disk <slot> IO incomplete.

• SES events

Level	Type	Description
Info	SES load conf. OK	Info: SES configuration has been loaded.
Warning	SES Load Conf. Failure	Error: Failed to load SES configuration. The SES device is disabled.
Info	SES is disabled	Info: The SES device is disabled.
Info	SES is enabled	Info: The SES device is enabled

• Environmental events

Level	Type	Description
Info	Admin Login OK	Info: Admin login successfully.
Warning	Admin Login Fail	Warning: Admin fails to login.
Info	Admin Logout OK	Info: Admin logout successfully.
Warning	Admin Logout Fail	Warning: Admin fails to logout.

Error	Thermal critical	Error: System Overheated!!! The system will do the auto shutdown immediately.
Warning	Thermal warning	Warning: System temperature is a little bit higher.
Error	Voltage critical	Error: System voltages failed!!! The system will do the auto shutdown immediately
Warning	Voltage warning	Warning: System voltage is a little bit higher/lower.
Info	PSU restore	Info: Power <number> is restored to work.
Error	PSU Fail	Error: Power <number> is out of work.
Info	Fan restore	Info: Fan <number> is restore to work.
Error	Fan Fail	Error: Fan <number> is out of work.
Error	Fan non-exist	Error: System cooling fan is not installed.
Error	AC Loss	Error: AC loss for the system is detected.
Error	UPS power low	Error: UPS Power Low!!! The system will do the auto shutdown immediately.
Info	Mgmt Lan Port Active	Info: Management LAN Port is active.
Warning	Mgmt Lan Port Failed	Warning: Fail to manage the system via the LAN Port.
Info	RTC Device OK	Info: RTC device is active.
Warning	RTC Access Failed	Warning: Fail to access RTC device
Info	Reset Password	Info: Reset Admin Password to default.
Info	Reset IP	Info: Reset network settings set to default.

• System config events

Level	Type	Description
Info	Sys Config. Defaults Restored	Info: Default system configurations restored.
Info	Sys NVRAM OK	Info: The system NVRAM is active.
Error	Sys NVRAM IO Failed	Error: Can't access the system NVRAM.
Warning	Sys NVRAM is full	Warning: The system NVRAM is full.

• System maintenance events

Level	Type	Description
Info	Firmware Upgraded	Info: System firmware has been upgraded
Error	Firmware Upgraded Failed	Error: System firmware upgrade failed.
Info	System reboot	Info: System has been rebooted
Info	System shutdown	Info: System has been shutdown.
Info	System Init OK	Info: System has been initialized OK.
Error	System Init Failed	Error: System cannot be initialized in the last boot up.

• LVM events

Level	Type	Description
Info	VG Created OK	Info: VG <name> has been created.
Warning	VG Created Fail	Warning: Fail to create VG <name>.
Info	VG Deleted	Info: VG <name> has been deleted.

Info	UDV Created OK	Info: UDV <name> has been created.
Warning	UDV Created Fail	Warning: Fail to create UDV <name>.
Info	UDV Deleted	Info: UDV <name> has been deleted.
Info	UDV Attached OK	Info: UDV <name> has been LUN-attached.
Warning	UDV Attached Fail	Warning: Fail to attach LUN to UDV <name>.
Info	UDV Detached OK	Info: UDV <name> has been detached.
Warning	UDV Detached Fail	Warning: Fail to detach LUN from Bus <number> SCSI_ID <number> LUN <number>.
Info	UDV_OP Rebuild Started	Info: UDV <name> starts rebuilding.
Info	UDV_OP Rebuild Finished	Info: UDV <name> completes rebuilding.
Warning	UDV_OP Rebuild Fail	Warning: Fail to complete UDV <name> rebuilding.
Info	UDV_OP Migrate Started	Info: UDV <name> starts migration.
Info	UDV_OP Migrate Finished	Info: UDV <name> completes migration.
Warning	UDV_OP Migrate Failed	Warning: Fail to complete UDV <name> migration.
Warning	VG Degraded	Warning: VG <name> is under degraded mode.
Warning	UDV Degraded	Warning: UDV <name> is under degraded mode.
Info	UDV Init OK	Info: UDV <name> completes the initialization.
Warning	UDV_OP Stop Initialization	Warning: Fail to complete UDV <name> initialization.
Warning	UDV IO Fault	Error: IO failure for stripe number <number> in UDV <name>.
Warning	VG Failed	Error: Fail to access VG <name>.
Warning	UDV Failed	Error: Fail to access UDV <name>.
Warning	Global CV Adjustment Failed	Error: Fail to adjust the size of the global cache.
Info	Global Cache	Info: The global cache is OK.
Error	Global CV Creation Failed	Error: Fail to create the global cache.
Info	UDV Rename	Info: UDV <name> has been renamed as <name>.
Info	VG Rename	Info: VG <name> has been renamed as <name>.
Info	Set VG Dedicated Spare Disks	Info: Assign Disk <slot> to be VG <name> dedicated spare disk.
Info	Set Global Disks	Info: Assign Disk <slot> to the Global Spare Disks.
Info	UDV Read-Only	Info: UDV <name> is a read-only volume.
Info	WRBK Cache Policy	Info: Use the write-back cache policy for UDV <name>.
Info	WRTHRU Cache Policy	Info: Use the write-through cache policy for UDV <name>.
Info	High priority UDV	Info: UDV <name> is set to high priority.
Info	Mid Priority UDV	Info: UDV <name> is set to mid priority.
Info	Low Priority UDV	Info: UDV <name> is set to low priority.

C. Usage notes

1. Microsoft MPIO does not support Windows XP or Windows 2000 Professional.
   A: Use Windows Server 2003 or Windows 2000 server to run MPIO.

2. I can ping the management port successfully but cannot access Web GUI.
   A: Connect the network cable to the management port before booting.

3. What to do when I forgot the IP Address and cannot login?
   A: For AccuRAID AR108I, you can check through LCM directly, or you can check through RS232's login management interface.

4. When using AccuRAID AR108I series products, are additional drivers required under different operation
   systems?
   A: Because an iSCSI interface is used, so the user have hardware with a network card that supports IEEE 802.3 1000 BASE-T standard in order to work with AccuRAID AR108I series products, in order
   to achieve maximum performance. As long as the operating system and hardware can activate correctly, its network interface should be able to use AccuRAID AR108I series products.

5. Are AccuRAID AR108I series products compatible with any hard disk?
   A: Please refer to the hard disk list in Attachment A. That hard disk list has passed a stringent certification process. Please use that list as your reference for selecting the necessary hard disks, and it's recommended that hard disks with the same brand and capacity to be used for maximum performance. But hard disks that aren't listed in the list should also be completely compatible. If compatibility issues are discovered with hard disks during installation, contact **info@sansdigital.com**.

6. My transmission performance is terrible?
   A: When you confirm all the hardware is properly installed without issues, check your peripheral network devices, including network card, network cable and the HUBs or Switches connected, to ensure they support IEEE 802.3 1000 BASE-T standard. If your peripheral devices don't meet the higher standard, the overall performance will be influenced. Of course, you can adjust Stripe Capacity/Write or read/Priority to improve the overall performance.

7. What to do when login/password is lost?
   A: If you lose or forget your password, please contact **info@sansdigital.com** for assistance.